FOOD Manufacture

Incorporating Canning, Packing, and Preserving

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

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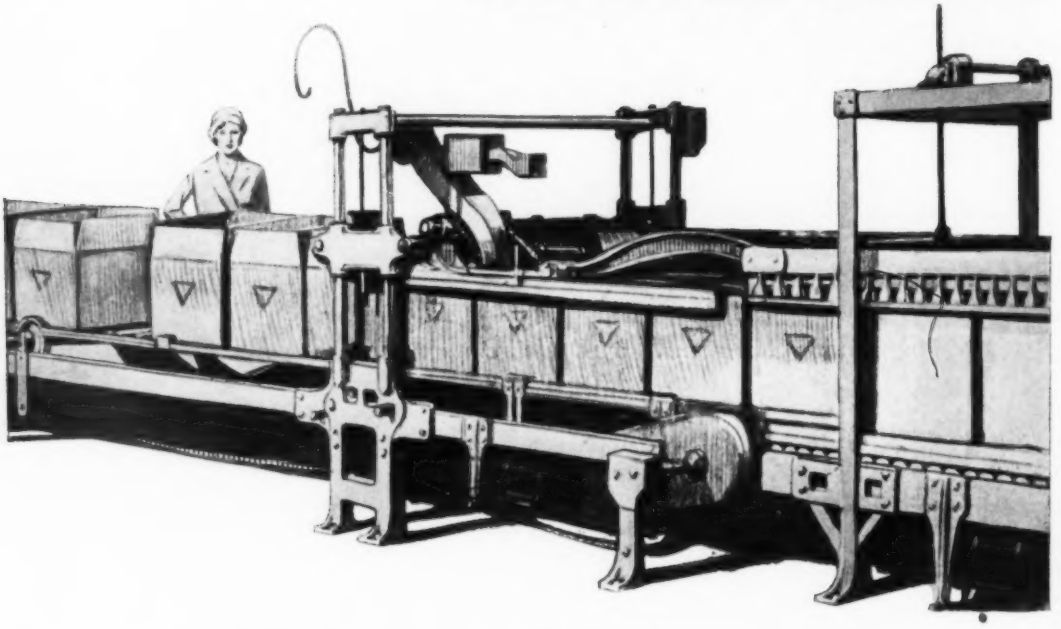

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with

"FIBERITE" CASES

Manufacturers

F. 167 A

THAMES BOARD MILLS LIMITED, PURFLEET, ESSEX

Food Manufacture

Incorporating Canning, Packing, and Preserving

Vol. VII. August, 1932 No. 8

Conferences.

ONE OF the most instructive and best arranged conferences we have ever attended was held by the British Works Management Association at the Park Lane Hotel, London, on July 15. At this conference the modern methods of packing and bottling were reviewed and discussed. The morning session was occupied by an excellent address by G. T. Harwood Stamper (manager of the tea factory, J. Lyons and Co., Ltd.) on conveyorised packing and bottling, and the afternoon by an equally useful address by B. A. Bull (director of production, Boots Pure Drug Co., Ltd.) on costs of packing and bottling. Both were followed by general discussions.

This conference differed from all others we have attended in that it was not overloaded with highly specialised papers. There were only two papers, and these were of so general and vital a nature that they afforded sufficient discussion for the whole day. Furthermore, the conference occupied a single day, so that it did not bore, fatigue, and inconvenience members, and it was informal and "homely," so that it did not petrify members with self-consciousness.

If more conferences were arranged on this plan, they would be more popular and more instructive than is usually the case.

A Difficult Question.

Of course, there was a lunch enlivened by two excellent speeches, one by E. J. Fox, the capable managing director of the Stanton Ironworks Co., Ltd., and president of the B.W.M.A. Mr. Fox sees the beginning of a break up of large amalgamations, backed by outside finance and other interests, into more efficient small units. One question he asked, which is of interest to food experts, was: "Why, in the large London hotels where one can get every food luxury that human ingenuity has devised—even nightingales stuffed with violets—is one unable to obtain a piece of stale bread?" There was no reply to this—not even from the guest, Sir Steven Bilsland, director of Bilsland Bros., Ltd., the prominent Glasgow firm of wrapped-bread manufacturers.

Sir Steven, in the course of an interesting address on packing in general, upon which he is regarded as an authority, was emphatic in his opinion that no amount of good packing will ever sell a poor article twice. He made a plea for the necessity of breaking away from our previously all too prevalent self-contained and self-satisfied outlook and opening up new trains of thought and, in general, bringing new ideas and new vitalising influences into industrial development—such as he has so successfully applied to the remarkable advancement of his own particular business.

Preserving Green Fodder.

One of the most important events during the Swedish Agricultural Week last March was a lecture by Professor Virtanen on the A.I.V. method of ensilage—*i.e.*, the process of preserving green fodder in its succulent condition, instead of first drying it into hay. Professor Virtanen has favoured us with a full report of his lecture, from which we have compiled the following brief notes:

Hitherto it has not been found possible, on a large scale, to prevent losses in silage due to respiration and the breakdown of proteins by proteolytic enzymes. Virtanen has now found that when the *p*H of the ensilage has a value of, say, 3·6 the rate of respiration is reduced by about 80 per cent. and the breakdown of proteins is completely avoided. At *p*H 3 respiration ceases altogether. In all cases where the acidity of the ensilage was brought below *p*H 4, successful preservation resulted; proteolytic enzymes are stated by Virtanen to be incapable of action below *p*H 4. It should be noted that the acidity of silage during storage increases naturally, due to the acid

fermentation of carbohydrates, lactic, acetic, and butyric acids being produced. The extent to which the *p*H is lowered by these means is, however, not sufficient to prevent altogether the breakdown of the proteins. Virtanen supplements this naturally produced acid by the addition of mineral acids—*e.g.*, sulphuric or hydrochloric acids—in amounts required to bring the acidity of the silage below *p*H 4. These amounts are so small that no harmful physiological results can follow.

This is an exceedingly important achievement, especially for northern agricultural communities. Figuratively speaking, it ensures the possibility of the feeding of cattle on pasture grass throughout the year. Certain farms in Finland have already commenced feeding their cattle almost solely on A.I.V. fodder.

It is important to note that Virtanen states that with hydrochloric acid and certain acid mixtures no harmful effects on the general health of the animals could be observed and that they eat A.I.V. fodder with great relish. He also claims that there is no destruction of vitamins and that the milk and butter are unimpaired in all nutritive qualities.

F.I.B. Service.

The Food Investigation Branch of the Department of Scientific and Industrial Research has embarked upon a new scheme of rendering technical service to industry. It is issuing a series of brief pamphlets dealing with practical problems connected with the storage of foodstuffs. These leaflets will be supplied gratis to those interested, on application to the Department (16, Old Queen Street, London, S.W. 1).

The first two leaflets were issued a few days ago. Leaflet No. 1, by Drs. Kidd and West, is entitled "The Cold-Storage of English Plums," and covers questions of temperature, handling, fungal rotting, packing, type of store, cultural conditions, and weather conditions—the matter being brief and to the point.

Leaflet No. 2, by Dr. J. Barker and T. Morris, is entitled "The Preservation of Fruit and Vegetables by Freezing," and is divided into two parts—the principles of preservation by freezing and practical details, the latter discussing questions of temperature and storage for direct consumption, canning, and jam.

An invitation is extended to all who require further information to communicate with the Low Temperature Research Station, Cambridge.

The Bridge.

Everyone will agree that this is an excellent move on the part of the F.I.B. We have already remarked that the great need nowadays is for more efficient means for rendering assimilable by industry the enormous output of more or less fundamental research. Evidently the F.I.B. is also fully alive to this necessity. We venture to say that there are not many engaged in industry who have had the scientific training to enable them to take full advantage of the excellent reports issued from time to time by the F.I.B. They evoke admiration, but are quite beyond the full understanding of the majority. Thus they fail in their objective, which is to convey to the factory the information gleaned by arduous and brilliant research work. Rather are they written by scientists for scientists. However, more leaflets written on the lines of Nos. 1 and 2 will get over this difficulty.

Food Literature.

This affords an opportunity for brief comment on another direction in which the F.I.B. assists the food industry. In 1929 the first "Index to the Literature of Food Investigation" was issued; since then five others have appeared at intervals. They are compiled by Miss A. E. Glennie, B.Sc., at the library of the Low Temperature Research Station. These publications do not appear to be known as widely as they deserve to be; they cover a wide field of original papers and are fairly complete, particularly on the more scientific side. The references are supplemented by a brief statement of the scope of the papers, which is helpful to the works chemist. The only adverse criticism we have to make (and we have made it before) is that the matter could with considerable advantage be better arranged in order to facilitate reference. Further, we would suggest that a subject-matter index be introduced.

Frozen Cider.

Professor R. B. Harvey, of the University of Minnesota, suggests that orchardists might make a considerable profit from preparing high quality cider to be sold in the frozen condition. In U.S.A. it is apparently the practice to make vinegar from cider that is unsold a few days after it is pressed; pasteurising or boiling the cider alters its flavour.

Experiments made at University Farm for the past two years indicate that the best way to avoid these difficulties of keeping cider in a fresh condition is to freeze it in waxed paper cartons. This may be carried out effectively at 0° F. Professor Harvey states that in this condition, if held at 0° F., it may be stored without detriment for seven months or more, and that when thawed out it is perfectly fresh.

The usual paper cartons impart a flavour of pulpwood to the cider, but heavily paraffined cartons are blameless in this respect. Soft paraffin should be used in order to avoid cracking and peeling.

Honey Spoilage.

A very intelligent discussion of the factors determining the keeping qualities of honey is presented by E. J. Dyce in *Cornell University Expt. Sta. Bull.* 528, 1931, which should enable one to bring the crystal-

lisation and fermentation of honey under scientific control.

Normal fermentation and spoilage in this product are ascribed to sugar-tolerant yeasts, and the favourable factors for their activity are coarse crystals, a high water content, and the abundance of pollen grains. The last named supply nitrogenous compounds to the yeasts. The size of the crystals and the water content are related in that the latter increases when the crystals are relatively coarse. At the same time crystals should be present, but they should be as small as possible. Hence it is important to be able to control their size. This is best done by use of a "honey starter," which consists of the addition at a temperature of about 75° F. of 5 to 10 per cent. of a previously processed, finely crystallised honey, followed by thorough agitating and mixing. The product is then filled into the final containers and stored for two days at about 57° F., after which the honey can be stored at any temperature without danger of fermentation or liquefaction.

The best temperature at which to pasteurise honey to prevent fermentation by yeasts is given as 130° F. for 30 minutes. At 160° F. the flavour and colour are injured, particularly when followed by slow cooling. It is recommended to pasteurise all honeys before storage or marketing.

Fish Canning Conference.

The Fifth Pan-Pacific Conference, which was to have been held at Victoria and Vancouver, British Columbia, this year, is postponed until next year. The chairman of the Technological Committee is Ernest D. Clark, well known as director of the north-west branch of the National Canners' Association, Seattle. Other familiar figures in fisheries technology who are members of this committee are H. R. Beard, head of the research department of the Canadian Fish Company of Vancouver; Harden F. Taylor, well-known inventor and authority on fisheries products and president of the Atlantic Coast Fisheries Company of New York City; and Dr. D. K. Tressler, director of the research laboratory of the General Seafoods Corporation and the Birdseye Frosted Foods at Gloucester, Mass. This committee is busily engaged in making a survey of new developments along technological lines to serve as a basis for the preparation of a report to the Conference.

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Aluminium Again.

It is sometimes difficult to find an apt expression conveying a wealth of meaning in a few words when applied to a particular set of circumstances. We have sought among the proverbs and trite sayings of the Chinese, Japanese, and other peoples for a few words of wisdom that would best describe the predicament in which the anti-aluminium gentlemen find themselves now that their dietetic nightmares have been capped by Einsel and Rowland, but so far without avail—unless it is that a certain phrase of obscure origin and whose original meaning resists elucidation is not too subtle for our somewhat serious-minded friends. We quote this phrase with some trepidation as, although in our opinion it meets the case admirably, yet to many it may appear unduly vigorous and "colourfull." According to the wise authority we have consulted, the position is like the gentleman who was "slapped over the belly with a dead fish"! This appears to be the opposite of "flogging a dead horse," and yet it conveys much the same meaning, coupled with a sense of insult and a feeling of injury; in fact, it would be a humiliating experience for even the worst of us.

And now for Einsel and Rowland.

Einsel and Rowland.

In the *Ohio State Medical Journal* of March, 1932, Drs. Einsel and Rowland reported the results of their work on the treatment of peptic ulcer and hyperacid states with aluminium oxide, which are summarised as follows:

1. Aluminium hydroxide is useful in the treatment of peptic ulcer and is free from the disadvantages of absorbable alkalies and the danger of alkalosis.

2. Aluminium hydroxide powder is chemically neutral by titration with N/10 HCl and has little neutralising power in the gastric secretion. A gelatinous aluminium hydroxide cream will neutralise ten times its volume of N/10 HCl and reduce gastric acidity better than free alkali.

3. Blood analysis shows practically no absorption of aluminium hydroxide in 32 grm. daily dosage and no alteration of the acid-base balance. There is no evidence of toxic action upon kidneys or other organs.

4. Symptomatic relief was surprisingly prompt and continuous in 92 per cent. of 38 X-ray positive duodenal ulcer cases.

It was found that the use of aluminium hydroxide in colloidal form (referred to as "colloidal cream") was attended with certain advantages. This is an amphoteric substance with a slight astringent but not unpleasant taste. It gives no gastric irritation or constipation, and produces a greater and more prolonged neutralisation in the stomach than any of the other alkalies — sodium bicarbonate, magnesium oxide, or calcium carbonate.

Digesting Research.

Referring to the tremendous output of scientific research, F. W. Sperr, of the Koppers Research Corporation, recently stated that "a good deal of the present trouble is due, not to the research organisations, but to a certain incapacity on the part of many industries to digest research developments. What is

needed in many cases is more efficient means for giving the public the prompt benefit of the results of research."

This is undoubtedly true, especially if we accept Hugh Griffiths' view that "the object of any scientific study is purely economic in the sense that systematic knowledge enables us to transfer experience to a new field with the minimum of mental labour." To this we would add that so-called "pure science" is inseparably bound up with industrial activities, since it is from the latter that its funds are ultimately derived and into which, in the long run, the products of its labours find their way — after having passed through the digestive apparatus of the so-called "technical worker." Actually the process is a cyclic one of the supply and demand of knowledge linking up three great departments of mental activities, fundamental research, applied research (as we prefer to call them), and industry.

Scientific Publications.

In the above connection it is interesting to note that, according to *Nature*, the approximate number of scientific and technical books published in 1931 was: Great Britain, 1,500; Germany, 1,200; U.S.A., 400; other countries, 300. Thus, Great Britain is responsible for about 46 per cent., and Great Britain, Germany, and U.S.A. together for about 92 per cent. of the world's scientific and technical books. These figures are based on the lists published in *Nature*. In our opinion they do not represent the true figures; we would imagine that far more than 300 books of this character were published in 1931 in U.S.A., and we would not be surprised if the German output was higher than that from this country. However, we are no more than recording the impressions gained from hasty perusals of catalogues received in the Editorial Office from the three countries in question.

We do, however, emphatically endorse Sperr's views on the inadequate nature of the means for keeping the various departments of industry posted with the results of fundamental research, and in this respect a large part of the blame is to be ascribed to the fact that the technical press and the organisations entrusted with applied research have failed, in many instances, to appreciate their proper function as the "digestive apparatus" interposed between fundamental research and industry.

Gas Storage.

The other day we were greatly surprised to find on the front page of the daily Press, where one expects nothing less than domestic tragedies and Hollywood sensations, an announcement in the full dress of headlines, etc., of the possibility of importing beef in gas storage from Australia. On enquiring if anything of a technical nature had been published recently, we were referred to three papers on the gas storage of meat contributed to the *Journal of the Soc. of Chem. Ind.* on April 8, 1932. These papers were "The Inhibition of Mould Growth on Meat by Carbon Dioxide," by Moran, Smith, and Tomkins; "Gas Storage of Pork and Bacon," by Callow; and "The Effect of Carbon Dioxide on Bacterial Growth with Special Reference to the Preservation of Fish," by Coyne. The first two emanated from the Low Temperature Research Station, and the third from the Torry Research Station.

It is known that CO_2 does not inhibit growths of all types of organisms. In the first paper it is stated that a marked inhibition of the growth of bacteria on legs of lamb has been observed in 10 or 20 per cent. CO_2.

The second paper states that the use of CO_2 increased the storage life of pork more than four times, and that the storage life of mild-cured, green bacon was more than doubled at 5° C. by using an atmosphere of CO_2.

In the third paper no definite statements are made on the gas storage of fish beyond remarking that at 2° C. preservation with CO_2 had a beneficial effect.

Rhubarb Canning.

In 1925 Clough and Clark published an important paper on springers and swells in canned rhubarb, and it is worth while reminding readers of their conclusions.

It appeared to these authorities, as a result of this piece of work, that of the various possible methods of packing rhubarb the best one consisted in soaking the cut rhubarb in cool water overnight, then softening it somewhat in a steam blanch, placing it in cans with boiling water or previously boiled syrup, exhausting, closing, cooking, and cooling. This conclusion is borne out by the fact that the packer using this method never has trouble with his pack, while those using unsoaked rhubarb or a short soaking period frequently suffer losses from springers and swells.

Fish Preservation.

The use of carbon dioxide as a controlling agent of bacterial growth with special reference to the preservation of fish has been studied by Coyne (*J. Soc. Chem. Ind.*, 1932, p. 119 T). It is well known that bacterial growth and autolysis chiefly account for the deterioration of fresh fish, and in this particular investigation stock cultures were plated out on to horse heart agar, and single colony transfers were made into broth after incubation for four days at room temperature. The cultures were then plated out and the plates tested in air, in carbon dioxide, nitrogen, and hydrogen. All the test organisms showed marked inhibition of growth in carbon dioxide. The organisms which were inhibited by this gas were those which predominate in the normal bacterial flora of fish.

MEAT CANNING

By T. CROSBIE WALSH, F.I.C., F.C.S.

The author has had many years' experience in large New Zealand and South American Plants.

South American Cattle Country.

Its Scientific Control »

THE ULTIMATE aim of the meat canner, and, indeed, of any canner, must be the standardisation of his product. He establishes its nature and quality according to his own criterion and that of his customers. He should bear in mind, however, that his own criterion must be the most exacting. It is then his task to maintain that standard and to overcome any factors which tend towards the production of variations. To do this, he obviously must investigate what these factors are and to what extent they affect, throughout the whole gamut of his operations, the taste, consistency, colour, and all other properties of his final product.

The examples to be given in this article will mainly refer to beef products, but the same or similar principles will apply to " fish, flesh, fowl, or good red herring."

Loss of Weight.

Whether the canner is killing his own animals or not, there is an important consideration to be met in the loss of weight incurred in hanging or storing. It has an important bearing upon his costs and the proportions of added ingredients, which should always be reckoned in percentage weights of the original weight of raw material which is delivered into the factory.

Table No. 1 gives some figures obtained from actual experiment. Loss of weight will depend upon the humidity of the atmosphere, which was 75 per cent. in this particular case. It is somewhat surprising to note, save for extremes of humidity and dryness, the comparatively small influence exerted on the relative losses of weight by this factor.

TABLE NO. 1

Loss of weight due to hanging of beef from a two-year-old steer in good condition. The times indicated are calculated from the appearance of " rigor mortis."

Temperature. (° C.)	*Time of Hanging.*	*Loss Per Cent.*
18	2 hours	1·66
18	4 ,,	3·87
18	7 ,,	6·13
18	24 ,,	12·48

The figures in the above table are not presented as absolute ones, as so much depends upon the nature of the raw material, but they may serve to point out the necessity of taking the loss in hanging factor into account by a canner pretending to any system of complete control.

Acid Formation.

During the past few years, meat canners have encountered difficulties which in many cases have been traceable entirely to the presence of varying quantities of acid formed in their raw material through storing.

The different effects of acid will be discussed later in this article. Table No. 2 will show the development of acidity of raw, lean beef after various periods and at different temperatures. In column 4 is given the titration according to Sorensen's method with formalin. It is additional to the acid as lactic acid shown in column 3.

The acid contents of meat are by no means of

purely academic interest, but determine vitally *practical* issues, as will be seen when such aspects come to be discussed.

TABLE NO. 2

Temperature of Hanging. (° C.)	*Time of Hanging.*	*Acidity as Lactic Acid.*	*Formalin Titration (Sorensen) as Lactic Acid less Acidity as Lactic Acid in Col. 3.*
18	*Rigor mortis*	0·488	0·855
18	2 hours	0·493	0·947
18	4 ,,	0·493	0·975
18	7 ,,	0·595	0·975
18	24 ,,	0·597	0·976
23	Nil	0·325	0·535
23	2 hours	0·337	0·573
23	4 ,,	0·339	0·575
23	6 ,,	0·344	0·620
23	8 ,,	0·387	0·659
23	24 ,,	0·628	0·856
23	48 ,,	0·456	0·770

A Modern Packing House Laboratory.

(This photograph was taken in the factory of Angus Watson and Co., Ltd., and is published with their kind permission.)

In the second series the beef was from a different animal and the original acidity was lower. Between 24 and 48 hours ammoniacal compounds began to form and the acidity dropped in consequence.

The action of acid upon meat products is far-reaching. A properly matured meat after canning "melts in the mouth"; the muscle fibres are softened, and a smooth, velvety appearance is produced. Sliceability is enhanced, and the pink colour of cured meats is more vivid. Meat pastes have a smoother texture and mature more quickly in the jar. Upon important by-products, such as extracts and essences, the effect is even more noticeable, as will be demonstrated when these products come to be discussed.

Loss of Colour.

A matter upon which many canners appear from time to time to find themselves "at sea" is the maintenance of the pink colour of preserved, cured meats after exposure to air. Complaints may be made that some hours after the meat is sliced it loses its fresh pink colour and becomes brown and dark.

This is a serious matter for the retailer who is selling meat in slices and who is obliged to lose a slice or two from a relatively small slab.

Many vague theories have been put forward to explain this rapid loss of colour, among them being excess or deficiency of nitrate or nitrite. The writer investigated this matter and the following were some of his experiments:

Effect of Nitrate.—Two samples of beef were cured, canned, and sterilised:

1. Normal production containing only traces of residual nitrate and nitrite.

2. Normal production to which 0·5 per cent. of additional potassium nitrate was added, this constituting a large excess.

These samples were opened, after three weeks incubation at 40° C., and carefully compared. There was no evidence of any promoting or retarding effect of nitrate of potassium on darkening.

Direct Effect of Nitrate.—Preserved meat was sliced into two portions. One slice was exposed to sunlight under a film of pure distilled water and the other under similar conditions under a film of water containing 0·5 per cent. of potassium nitrate.

Absolutely no difference was noted between the two samples, and no nitrite was detectable (by analysis) in the slice which had been treated with nitrate.

Effect of Humidity.—Two samples were taken; one was placed in a desiccator containing concentrated sulphuric acid and the other in a similar vessel containing pure water. The sample in the dry vessel darkened considerably more in 8 hours than the one placed over water, and the difference in 22 hours was very marked.

Effect of Excess of Nitrate During Pickling.—Two

A Freezing Works in New Zealand.
(By courtesy of the High Commissioner for New Zealand.)

experimental lots of beef were cured under standard conditions, one with nitrite of sodium in minimum quantities and the other with a large excess of nitrate of potassium. (The curing of meats with nitrite was fully discussed by the writer in a previous number of FOOD MANUFACTURE.) It was found that the sample cured in contact with *excess* of nitrate lost its colour much more quickly than the other.

Referring back to the previous experiments on the effects of nitrate, it is evident that these are due to action during curing, the nitrate having no effect if added after curing and opening.

Effect of Sunlight.—Samples were exposed to strong sunlight for 6 hours under varying conditions, *i.e.*:

1. In air saturated with moisture.
2. In dry air.
3. In normal atmosphere.

Control samples were kept in the dark for the same period and at the same temperature.

Careful comparison demonstrated no difference between the pairs of samples which had been submitted to similar treatment.

Effect of Fat Content.—The presence of fat had a marked inhibiting effect upon darkening, which increased as the fat content increased.

Effect of Moisture Content.—Moist packs kept their colour longer than those with reduced water content.

The conclusion drawn from the above experiments and observation of operations on a large scale for some years is that the retention of colour in cured meats may be greatly improved by:

1. An avoidance of any appreciable excess of potassium nitrate in the pickle.
2. The presence of maximum moisture content compatible with other required characteristics.

Dressing Hogs at a Packing House in Toronto.
(By courtesy of the High Commissioner for Canada.)

3. The presence of the maximum percentage of fat, which, producing a film on the surface, inhibits evaporation of moisture.

Loss of moisture is the principal cause of loss of colour, as may be demonstrated by allowing a piece of correctly cured meat to become completely black. If this blackened piece of meat be immersed in water, it will revert almost to its original pinkness.

Gelatine.

Another matter which appears to trouble meat canners is the appearance and consistency of the gelatine contained in their products. Usually their complaint is that the gelatine is too liquid. It is probably a coincidence that they seek advice and open up their cans on an abnormally hot day. They sometimes appear unwilling to accept the inconvenient (for them) fact that gelatine of a certain strength, even if not treated roughly, must melt at a certain temperature.

Sterilisation times and temperatures have great influence upon setting points. The following experiments were made at the time when low temperature sterilisation over protracted periods had not been replaced as a general practice by high temperatures and shorter times. It was desired to obtain a gelatine of such strength that it would set satisfactorily at 19½° C. (or approximately 67° F.).

Observations were made:

1. Before sterilisation.
2. After sterilisation for 5½ hours at 100° C.
3. After sterilisation for 5½ hours at 105° C.

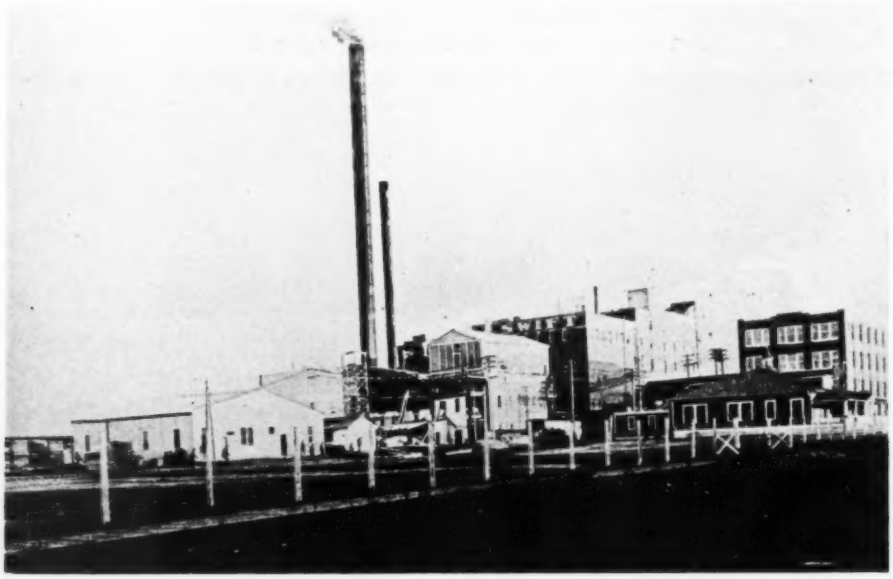
The solution of gelatine was made from feet of oxen and rapidly evaporated to 13° Baume measured at 60° C. Solutions of 10, 11, 12, and 13 degrees were prepared from this and divided into three portions. The following results were obtained:

TABLE NO. 3

Setting Points of Gelatine of Varying Strengths

Solution of Gelatine at 60° C.	*Original Setting Point in ° C.*	*Setting Point in ° C. after 14 Days.*		
		Unsterilised. (° C.)	*Sterilised 5½ hrs. at 100° C.*	*Sterilised 5½ hrs. at 105° C.*
10° Bé.	19	19	18	16
11 ,,	20	20	18½	17
12 ,,	21	21	19	18
13 ,,	22	21½	20	18½

An indication of the consistency of the above solutions, according to treatment, is contained in Table No. 4.



Swift's Meat Packing Plant at Edmonton, Alberta.
(By courtesy of the High Commissioner for Canada.)

TABLE NO. 4

Consistency of Gelatine Solutions at 19½° C.

Solution of Gelatine at 60° C.	*Not Sterilised.*	*Sterilised 5½ hrs. at 100° C.*	*Sterilised 5½ hrs. at 105° C.*
10° Bé.	Very stiff	Just stiff. Would pass muster in meat pack	Flowing fairly freely
11 ,,	Very stiff	Quite stiff	Just beginning to flow
12 ,,	Very stiff	Quite stiff	Just beginning to flow
13 ,,	Very stiff	Quite stiff	Viscous. Would just pass for meat pack

Further experiments demonstrated that as the temperatures of sterilisation increased the consistency of

Curing Bacon in Queensland.
(By courtesy of the Agent-General for Queensland.)

gelatine decreased. It should be added that deficiencies in consistency may be compensated for by the employment of natural collagenous matter such as minced sinews.

Sterilisation of Meat Products.

No hard-and-fast rules can possibly be laid down as to the times and temperatures required by any pack.

It is an undoubted fact that the presence of very slightly differing proportions of salt, lactic acid, and other substances, which do not have direct preservative or bactericidal properties, modifies the temperature requirements. Their action cannot be attributed to the better conduction of heat to the most remote parts of the can. Obviously, in the process of sterilisation the selected temperature must reach the most remote spot. In canned beef this will be the very centre of the can.

The writer deprecates the existence of "cookery book recipes" for sterilisation, although probably they allow a tremendous margin, which has its repercussion upon the quality of the product.

The ideal method of sterilisation is to arrive at the exact safety-point, which is not necessarily complete

Packing Canned Meats in Toronto.
(By courtesy of the High Commissioner for Canada.)

sterility, as is evidenced by the frequent finding of *B. subtilis* in perfectly good and wholesome cans. Having arrived at this point, a reasonable margin is added. In this way undue deterioration of the product by overheating is prevented. Such a method requires expert bacteriological intervention, which is available at the experimental stations in the event of the canner not having his own scientific staff.

Strict cleanliness in the factory has an enormous bearing on sterilisation. Carefully prepared foodstuffs should be comparatively free from the more terrifying species of resistant spore-bearing organisms, and it is a pity to introduce them into the can through disregard of strict rules of ordinary cleanliness and to have subsequently to kill them. These remarks may appear to be unnecessary and unpleasant; the writer has not the slightest doubt that there is not a dirty factory in the British Isles, but there must be taken into account the less obvious "dirt" conveyed by water, wind, hands of operatives, etc.

A Round-up of Argentine Cattle.

Sterilisation Problems.

That the question of sterilisation is not as simple as it might appear may be gathered from the case cited by the author in a previous article in FOOD MANUFACTURE, "Bacteriology in the Canning Factory," in which mention was made of a bacillus whose spores acquired increased resistance which rendered inefficient a long-standing system of sterilisation. The nature of regional flora must not be ignored. As a matter of fact, in the case of the bacterium which acquired resistance, it did not partake of the nature of a naturally occurring micro-organism in or near the factories where it appeared, and, in spite of rigorous search in water, wind-borne dust from all points of the compass, soil from adjoining plots of land, etc., it was never rediscovered except on rare occasions and then only in the pack.

In view of the possibility of such occurrences, the author favours *complete* sterilisation as against admitting the possibility of the presence even of harmless spores. It may be that a very slight prolongation of the time of sterilisation will bring about the desired effect. Prolongation of time is preferable to a higher temperature; in fact, from a long observation of packed meats the author pins his faith on the lowest effective temperatures applied over an extended time as against high temperatures over shorter times. It is obvious that this implies a larger number of retorts to do the same work, and the manufacturer must use his judgment in determining whether the better quality of his pack warrants the extra capital outlay.

It may be taken roughly that non-sporing bacteria will not survive exposure in moist media at a temperature of 80° C. and that five minutes at 110° C. will kill sporing varieties. The possible presence of organisms which do not follow this rule must be established, and constant control exercised. Thus, sterilisation is complete when the most remote part of the meat, or the part most difficult to penetrate in the case of heterogeneous packs, attains 110° C. and is maintained there for the time mentioned.

Having arrived at the correct temperature and time (and there are many alternatives to be chosen from—at all events at the inception of a new pack) it is desirable to incubate the entire production. Again, the question of safety versus expense must be left to the judgment of the manufacturer.

The matter of times and temperatures having been satisfactorily determined, due attention must be given to their proper application. Disaster has ensued through faulty manipulation of retorts. Much loss has occurred by ignoring the necessity for a free circulation of steam through the retort. This is effected by a fairly generous opening of the exhaust cock of the retort.

In Part II. the author will discuss the scientific control of meat packing operations and the handling of sundry by-products.

(To be continued.)

Food manufacturers do not need to be reminded of the Biblical reference to the salt which lost its savour. Flavourless food is bad food, from all points of view.

FOOD AND FLAVOUR

By H. S. REDGROVE, B.Sc., F.I.C.

TO BE FOLLOWED BY AN ARTICLE ON THE MANUFACTURE OF FLAVOURING ESSENCES

THE IMPORTANCE of flavour to the food manufacturer cannot be overestimated. Truly, we have to eat in order to live; but, save in exceptional cases, our eating is carried out in no cold-blooded manner. We do not sit down and calculate how many grams of protein, of carbohydrates, and of fat, and exactly what minute amounts of the vitamins, we require, and then proceed to consume them. We eat because we like eating. Man is guided by instinct and taste; and it is primarily because of their flavours that he selects one food rather than another.

How many are prepared to pay high prices for certain foods—for example, mushrooms—because their flavours appeal, when for a fraction of the cost it would be possible to obtain an equivalent amount of nutriment in a less palatable form?

Nor are we wrong in doing this.

The enjoyment the epicure derives from an exquisitely prepared meal is entirely analogous to that which the musician experiences in listening to a fine musical performance, or the artist in gazing at a masterpiece of form and colour. Cooking is one of the fine arts, and the writer is prepared to defend the importance of flavour in food on æsthetic grounds alone. However, it has other virtues. It is now well known that the pleasure we experience in eating (or, indeed, merely smelling) well-flavoured food stimulates the secretion of the digestive juices. A flavourless meal is an indigestible one.

This, no doubt, accounts for the wide prevalence of indigestion in Great Britain. As a race, we have, with a ludicrous stoicism, tended to neglect the art of cookery, and, in the past, the food manufacturer has taken advantage of the fact. He has too often assumed that English folk are indifferent to flavour and will eat anything. He must look to his laurels. We are becoming better educated, probably because of the great increase in foreign travel since the war.

Now there are numerous foodstuffs which, although excellent from the point of view of the nutriment they contain, are very deficient in flavour. On the other hand, there are numerous materials (spices or herbs) which, although deficient in nourishing constituents, or unsuitable for use in massive amounts in foods, have powerful and agreeable flavours. The art of cookery consists, in part, of the correct blending of these two classes of products. And this, too, is the art which the food manufacturer must master if he is to achieve big sales for his products.

The appearance of a food product is important; but what is even more important is its taste.

The Mechanism of Taste.

Taste, using the word as it is commonly employed, is a complex phenomenon. We must distinguish between tastes proper, which are sensations derived from the taste-buds of the tongue and mouth, and flavours. The latter would seem to have the character of olfactory sensations, associated with tastes proper when food is eaten.

Tastes proper seem to be very limited in number. Perhaps sweet, salt, sour, bitter, alkaline, astringent, metallic, and pungent exhaust the list. Flavours, on the other hand, seem almost infinite in their variety.

Taste proper forms a background for flavour, and, to an extent, determines the character of the flavours, which must be chosen for combination with it if pleasing results are to be achieved. We should not appreciate vanilla as an accompaniment to salt or sweetmeats flavoured with garlic.

One might liken a taste to the base note in a musical chord, on which one has to build up a series of flavours so as to produce a pleasing harmony or piquant discord. No laws of combination are known to assist us in this task. The subject, worthy of more profound study, is still in a purely empirical stage of development.

Sometimes the palate (or, more correctly speaking, the nose) seems to demand one predominant and characteristic flavour. Sometimes it demands a "bouquet"—a pleasing combination of flavours to which no descriptive name can be given. The production of these compound flavours is of great importance for the manufacturer of sauces. His task is very like that of the perfumer who sets out to prepare, not a scent smelling like some well-known flower, but a "bouquet" suggestive of the odours of numerous fragrant flowers, in which none stands out above all others.

Ready-made sauces seem to be extremely popular in England, and, no doubt, save the housewife a great deal of trouble. Unfortunately, she too often places one and the same bottle on the table day after day. This is a gastronomic crime. Every dish demands its own sauce.

In connection with sauce manufacture, it seems desirable to add a few words concerning mace. This spice, used with discretion and skill, is one of the greatest utility to the manufacturer of sauces. For flavours of the savoury type it is probably the best blending agent known, a basic flavour upon which others may be superimposed, and one capable of giving a quality of smoothness to the whole composition. But, of course, the sauce must not taste of mace. Its taste must be both indescribable and delicious!

Flavouring Material.

Now, since flavour is essentially an olfactory phenomenon, it will be understood that only those materials possess flavour which contain volatile, aromatic constituents. Herbs and spices contain these constituents in relatively large proportions. The old alchemists sought for the soul of things, and the perfume of a sweet-scented flower, the aroma of a spice or herb, may well, using a picturesque terminology, be called its soul. Hence the word "essence," still used in France as a general term for these aromatic, volatile constituents. In Great Britain they are known as "essential oils," the term "essence" being restricted to preparations consisting of solutions of essential oils in alcohol or other suitable solvents. In the U.S.A. such preparations, when made with ethyl alcohol of the correct strength and with stipulated quantities of certain essential oils, as laid down in the Definitions and Standards for Food Products of the Department of Agriculture (Food and Drug Administration), are called "flavouring extracts."

The essential oils of spices and herbs can most conveniently be separated from them by the process of steam distillation; and a very large number are available in commerce. In some few cases other methods of extraction yield better results. Thus, in the case of *Citrus* fruits (oranges, lemons, etc.), direct expression yields oils of finer flavour than are got by distillation. In general, the essential oil represents the flavour of the herb or spice in its most concentrated form. Sometimes, however, the flavour falls a little short of perfection, owing (*a*) to chemical changes taking place during the process of distillation, and (*b*) removal of water-soluble constituents from the oil. On the other hand, the oils are devoid of the astringent taste associated with certain spices, etc., in virtue of the presence in them of non-volatile tannins.

Two Main Processes.

Without going into technical details, which must remain for treatment in a further article, it may be said that, in general, there are two main processes for the preparation of flavouring essences—namely, (i.) dissolution of the essential oil in a suitable solvent, preferably ethyl alcohol, and (ii.) extraction of the herb or spice itself by the solvent. The products of the first process may be described as "volatile flavours," those obtained by the second "extracted flavours," though care must be taken not to confuse between an "extracted flavour" so defined and the term "flavouring extract" as used in the U.S.A.

The question of pungency in spices calls for special consideration. Pungency, if not excessive, adds a big zest to a meal. It is the "dominant seventh" of the art of cookery, if the borrowing of a term from music is permissible.

Moreover, when pungent food is eaten, there follows dilation of the superficial vessels of the skin, sweating, and a drop in the temperature. This is why pungent dishes are so much appreciated in the tropics.

There seem to be two sorts of pungency, a pungent taste properly so-called and a pungent flavour. The pungency of black mustard belongs to the second type. Hence the essential oil of mustard is very pungent. It is, indeed, so pungent that the oil has to be handled with extreme caution. On the other hand, the pungency of pepper, for example, is a pure taste. The essential oil of pepper is aromatic, but quite mild in flavour. Ginger oil also lacks the full pungency of the spice itself.

In the case of spices such as pepper and ginger, therefore, when essences embodying their pungency are required, these must be made, not from the oils, but by extraction from the spices themselves. Solvents more volatile than alcohol can be employed—*e.g.*, acetone—and afterwards removed by distillation, leaving "oleo-resins" of extremely pungent taste.

The food manufacturer has, in general, four methods of incorporating natural flavouring agents in his preparations. He may use: (i.) The spices or herbs themselves suitably comminuted; (ii.) essential oils; (iii.) essences prepared from essential oils; and (iv.) essences prepared by extraction. In general, method (ii.) is not advisable, as it is difficult successfully to incorporate a small quantity of a liquid with a semi-solid mass, and the essential oils are so powerful that only very small quantities are required. A few drops too much may spell disaster. Method (iv.) is, perhaps, the ideal, but, according to the type of food product concerned, one or other of the remaining methods give quite satisfactory results in many cases.

LEMON JUICE in FOODSTUFFS*

By W. E. BAIER and J. W. STEVENS

A Californian Orange Grove.

THE JUICE of fresh lemons is used extensively in the home preparation of tasty foods, in which capacity it serves as a pleasing and healthful acidulent. Past attempts to make similar use of lemon juice in the commercial production of packaged foodstuffs have not been entirely successful in all instances, and have always met with strong resistance because of the trouble of preparing juice, its lack of standardisation, and the erratic nature of the results obtained. With the recent development of a particularly stable, standardised, concentrated lemon juice, however, commercial use increased immediately. Four applications of this new product to well-known packaged foods are described below and others are suggested.

Lemon juice, freshly extracted, contains citric acid, sugars, vitamin C, and mineral salts, and, in addition, the less frequently considered constituents, among which may be mentioned amino-acids; pectin, and its hydrolysis products; the enzymes pectase, peroxidase and others; citral and rind oil; the glucoside hesperidin; water insoluble yellow pigment and protein. Interaction of certain of these constituents causes alteration of flavour and physical character which it is desirable, if not imperative, to avoid. It has been found that vacuum concentrated lemon juice is less subject than fresh juice to certain changes in flavour, although it must be said that its initial flavour is not identical with that of unconcentrated or fresh juice. Employment of a process to eliminate enzymes is a recent step in the direction of increased stability. Also, the method of extraction and degree of concentration have been carefully studied and are controlled so as to give most satisfactory results according to the use to be made of the juice.

* Contribution from California Fruit Growers Exchange, Research Department, Ontario, California.

Lemon Juice in Canned Fruits.

Low-acid fruits, notably dehydrated prunes, cooked, canned, and processed in the most approved manner, are subject to very serious losses occasioned by corrosion of the tinplate. Kohman and Sanborn[1] have shown this to be due to the tin being less anodic with respect to iron in weak acid solutions, and they were able to reduce corrosion losses in such canned goods by the addition of citric acid. Morris and Bryan[2] and other workers obtained similar results, although all do not agree as to the mechanism of the electrochemical reactions involved. Kohman recognised the possible advantages of lemon juice over citric acid, and he first suggested to the writers its use in canned goods.

Canned Prunes.

The earliest attempts to use lemon juice in canned prunes, by Kohman and by Mrak,[3] and by the writers, resulted in flavour after storage which was inferior to that where citric acid had been employed. The indications were that highly concentrated juice (6 : 1 by volume) was more subject to off-flavour development than fresh juice in this particular use. However, it became evident that a low concentration (about 3½ : 1) resulted favourably as compared with freshly extracted or unconcentrated juice. Combining all methods known to aid in the stability of lemon juice resulted in a standardised product (Calemona No. 80), which has been proved successful in laboratory and commercial canning tests and practice.

The results given in Table I. are typical. With fresh and with ready-to-eat dehydrated prunes in syrup the amounts of lemon juice found desirable are such that the added citric acid falls within 0·5 and 1·0 per cent. of the weight of fruit. The *p*H of the cutout syrup should be reduced to 3·5 or as near to this point as is consistent with optimum taste and economy. Of a prepared lemon juice concentrated to contain 1·86 lb. anhydrous acid* per imperial gallon, 9·33 gallons would be recommended per ton of fruit, equivalent to 10 to 15 per cent. of natural strength lemon juice.

TABLE I.—EFFECT ON FLAVOUR AND CORROSION OF THE ACIDIFICATION OF CANNED READY-TO-EAT DEHYDRATED PRUNES.

Packed Eight 30/40 Prunes per No. ½ Plain Tin 3 7/16-inch Diameter in 20° Brix Sucrose Syrup.

Inspection Record. Storage at Room Temperature.	Unacidified.	0·5 Per Cent. U.S.P. Cryst. Citric Acid.	0·5 Per Cent. Anhyd. Citric as Lemon Juice (Calemona No. 80).
After 1 month : Taste (1 observer)	Good	Very good	Good
Condition of tins	No swells, slightly darkened	No swells, very slightly darkened	No swells, least darkened
After 6 months : Taste (7 observers)	Third best	Second best	Best
	No off flavours in any.		
Condition of tins	82 per cent. of hydrogen swells and springers	5 per cent. of hydrogen swells and springers	5 per cent. of hydrogen swells and springers

* The authors refer to anhydrous citric acid of molecular weight 192. Most readers in this country are accustomed to think in terms of crystalline citric acid, with one molecule of water of crystallisation and molecular weight 210.

Other low-acid fruits should be improved by employment of the stabilised lemon juice in the canning process. The preservation of artichokes and other vegetables may be accomplished with lower process temperatures and resulting improvement of quality by the addition of suitable acidulents as shown by several investigators and advocated by Cruess.[4] The discoloration of canned asparagus, investigated by Wiegand and Bullis,[5] and of Maraschino cherries, studied by Jeffrey and Cruess,[6] although from quite different causes, may be controlled by acid or lemon juice.

Fruit Salad.

Canned fruits for salads have been prepared by the writers with and without "Calemona No. 80." Fruit salad stock canned peaches, apricots, and pineapple and fancy canned pears and bottled Maraschino cherries were the fruit used. These were drained and repacked in No. 2 plain cans in 36° Brix syrup, in one series using the fortified mixed cutout syrups and in the other series using fresh sucrose syrup. In either case the syrups were first heated to boiling and lemon juice added as desired. The hot syruped, mixed fruits were exhausted 10 minutes at 190° F. and processed 20 minutes at 180° F. In Table II. are given the results of tests of the products after twenty days' storage at 28° C. (82·4° F.). Extension of the storage period is necessary before final conclusions are justified.

TABLE II.—INFLUENCE OF STABILISED LEMON JUICE ON CANNED FRUIT SALAD.

	Unacidified.	Acidified with Lemon Juice.*		
		0·3 Per Cent. Acid.	0·6 Per Cent. Acid.	0·9 Per Cent. Acid.
Total comparative score (as to flavour) of 24 observers	45	61·5	74·5	59
Colour of Maraschino cherries	Slightly dulled or faded, poorest	Bright red	Bright red	Brightest red, best

The method of recording the results of taste tests consisted of grading first, second, third, and fourth choices with scores of 4, 3, 2, and 1 respectively. The identity of the samples was, of course, unknown to the observers at the time of tasting. Both series, cutout and new syrups, showed similar benefits from acidification and Table II. represents all samples prepared.

Lemon Juice in Tomato Juice Cocktail.

Tomato juice cocktail formulas almost always call for lemon juice or an acidulent of some kind. Although the manufacturer may incorporate acid in his packaged product, most users still further enhance the flavour by the use of lemon at the table. It is apparent that the canner may control acid to

* Figures refer to anhydrous citric acid as per cent. by weight of syrup added in form of stabilised, concentrated lemon juice.

obtain a product which is more acceptable to all, whether or not lemon is served with it.

One of the first considerations in making an addition for the purpose of acidification of a packaged

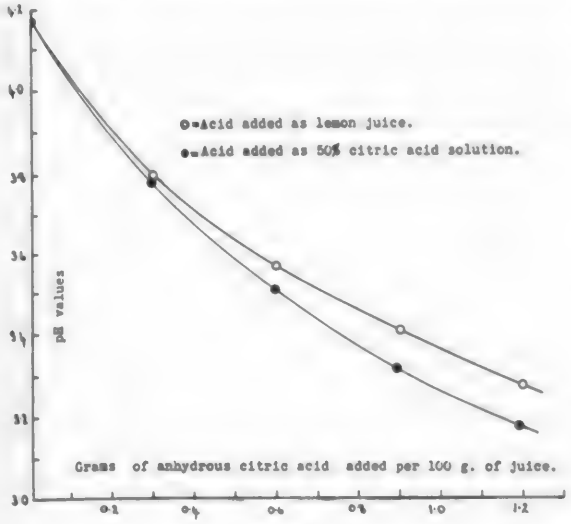

⊙=Acid added as lemon juice.
●=Acid added as 50% citric acid solution.
pH values
Grams of anhydrous citric acid added per 100 g. of juice.

FIG. I.

food product is the relation of the final active acidity to the amount added. Figure 1 shows this relationship as acidity *p*H curves for additions of concentrated lemon juice and of U.S.P. citric acid solution. Probably because of the high *p*H and highly buffered nature of the tomato juice, the difference between the effects of the two acidulents is not large. With respect to active acidity, therefore, either acidulent would serve.

One advantage of citric acid is stated by Wait[7] to be its uniformity as compared with lemon juice. While even extraordinary care in process control could not make a lemon juice concentrate as unvarying in both titrable and active acidities as citric acid, the writers have found the concentrated product mentioned previously to be entirely satisfactory and convenient.

A highly seasoned type of cocktail was used in the various flavour and storage tests to determine the value of lemon juice as to both improvement of flavour and stability. The basic test cocktail was composed of tomato juice, salt, cane sugar, spice oil emulsion, and paprika. Lemon juice was added to this mix as desired, and in the case of large additions it was thought advisable to increase the amount of cane sugar to balance the increased acid. The selected spice oils were used in the form of an emulsion, which was prepared with the aid of special emulsifying pectin. The emulsion was found to be very convenient as regards uniformity and ease of use. The emulsion, if it is to be stored, can be protected from mould and other growths by the addition of benzoic acid.

The various test samples were stored at 28° C. to determine their relative stability. Experience has shown that comparable results are obtained at this temperature, and that one month of such storage is equivalent to two to four months at room temperature, depending upon the season of the year and locality.

The results of the comparative flavour tests were recorded by an arbitrary scoring method as shown in Table III. For the solids: acid ratio of 16·4 maintained in the acidified samples, the most satisfactory amount of lemon juice is indicated as 3·5 per cent. by volume. Adjustment of this ratio permits such variations as may be desired by the individual packer.

TABLE III.—DATA OF COMPARATIVE FLAVOUR TESTS ON TOMATO COCKTAIL SAMPLES SHOWING IMPROVEMENT OF FLAVOUR BY THE ADDITION OF STABILISED LEMON JUICE.*

No. 2 plain tins, hot exhaust, 180° F. process. Samples stored at 28° C. (82·4° F.).

		Score of Flavour of Samples.†			
		A.	B.	C.	D.
Storage Period (Days).	Number of Testers.	Unacidified Solids: Acid Ratio 21·3.	Formula A Plus 2 Per Cent. by Volume of Lemon Juice. Solids: Acid Ratio 16·4 : 1.	Formula A Plus 3·5 Per Cent. by Volume of Lemon Juice and Sugar to 16·4 : 1 Ratio.	Formula A Plus 5 Per Cent. by Volume of Lemon Juice and Sugar to 16·4 : 1 Ratio.
Initial	13	28·5	33·5	34·0	34·0
47	12	19·5	32·0	36·5	32·0
112	14	27·0	34·0	40·0	39·0

Lemon Juice in Mayonnaise.

Mayonnaise, particularly of home preparation, has usually contained lemon juice as one of its recognised constituents, and the use of lemon by commercial manufacturers has been increasing. Joseph[8] pointed out the preferred proportions of lemon juice to vinegar and the advantages gained. Kilgore[9] has since shown the mechanism of the resulting increased oil stability to be a lowered acidity in the oil phase. Citric acid dissolves almost entirely in the aqueous phase, whereas acetic acid may dissolve in oil to such an extent that oxidation changes are accelerated.

Treatment of lemon juice, in order greatly to reduce its enzyme content, further enhances its value in that the stability of the emulsion is definitely improved and oxidising influences are greatly lessened, thereby improving also the stability of the oil phase itself.

The recent ruling in U.S.A., by which corn sugar or dextrose may be used in mayonnaise without declaration,‡ presents an interesting possibility. Because of the lower degree of sweetness and lower cost, more dextrose than sucrose may be used. If a relatively large amount of lemon juice is employed, the total sugar content may be increased by the addition of dextrose to the point where the total solids in the aqueous phase, derived from both dextrose and juice, will markedly extend the low temperature

* First choice scores 4 points, second choice 3 points, etc.

† Percentages refer to the amounts of natural strength lemon juice equivalent to the quantities of concentrate used.

‡ This refers to the definition of the U.S. Department of Agriculture.

stability of the mayonnaise. Table IV. illustrates this point.

TABLE IV.—COMPOSITION AND PROPERTIES OF MAYONNAISE. (COMPOSITION BY WEIGHT.)

	A.	B.
	(Per Cent.)	(Per Cent.)
Vinegar	18·2	5·0
Concentrated lemon juice (undiluted) (Calemona No. 62)	None	4·2
Corn sugar	None	9·0
Mixed spices (salt, mustard, sucrose)	2·0	2·0
Wesson oil	72·8	72·8
Fresh egg yolks	7·0	7·0
	100·0	100·0
Taste	Too sour	Somewhat sweet
Mobilometer test	2·4 seconds	175·5 seconds
Freezing test: Emulsion broke at	+17° F.	−6° to −10° F.

Both A and B mayonnaise formulas result in high quality and, under the present U.S.D.A. definition, legal products. The weight percentage of oil was made identical for ready comparison; the volume percentages would differ slightly. The principle is exemplified by these two rather extreme formulas. Between these are almost unlimited variations in which it is possible to employ the several advantages which lemon juice has to offer.

General Properties of Lemon Juice.

Lemon juice imparts an acid character to the flavour of food different from that of vinegar. The acetic acid of vinegar is both oil-soluble and volatile, the latter fact explaining its strong acid odour. Citric acid is water-soluble and non-volatile and, although it has a much higher active acidity than acetic acid, its acid flavour is confined to the taste component of flavour as distinguished from the odour component. The acid taste of lemon juice lends itself to balancing by means of water-soluble substances, sugars, and the like, in a way different from that of the acid flavour of vinegar. Such characteristics should be kept in mind by the user of lemon juice.

Summary.

Stabilised, concentrated lemon juice decreases corrosion losses and improves the flavour of canned prunes, and has application also in the canning of other low-acid fruits and in fruit salad. The same material has proved satisfactory as an acidulent in the packing of tomato juice cocktail. In mayonnaise, newly defined by the U.S. Department of Agriculture so as to permit the use of corn sugar, the stabilised lemon concentrate makes possible low temperature stability in addition to its other well-known advantages.

BIBLIOGRAPHY

1 *Ind. Eng. Chem.*, **22**, 615-617 (1930).
2 *Food Manufacture*, **6**, 100-102 (1931).
3 *Fruit Products Jour. and Amer. Vin. Ind.*, **10**, 310-311 (1931).
4 *Food Manufacture*, **7**, 115-119 (1932).
5 *The Canner*, **71**, 11 (1930).
6 *Ind. Eng. Chem.*, **21**, 1268-1269 (1929).
7 *Fruit Products Jour. and Amer. Vin. Ind.*, **10**, 367 (1931).
8 *The Spice Mill*, **52**, 1887-1889 (1929).
9 *Glass Packer*, **10**, 585-588, 610 (1931).

A VINEGAR RESEARCH STATION ?

July 11, 1932.

To the Editor.

DEAR SIR,

I have perused with great interest the article which has appeared in your columns recently on "The Manufacture of Pure Malt Vinegar." This is all to the good, for the day of secrecy so far as it relates to the brewing of malt vinegar is long since past.

The vinegar brewers themselves now realise the great advantages to be derived from publicity, and I am sure that both you and your contributors have done the industry, as a whole, a real service.

It is a comparatively easy matter to make vinegar of a kind, but it is a fine art to produce pure malt vinegar which is worthy of the name, and I should indeed hail with satisfaction the day upon which the vinegar brewers of this country decided to open a research department, so that difficulties which still exist might be overcome and the standard, which even now is high, might be raised higher still. Seeing that amalgamation is taking place, and both old and new vinegar brewers are coming closer together, it is possible that day is not so far distant as would otherwise have been the case.

Much comment could be made upon the information given in the article, but that is not to be wondered at seeing the subject is an almost inexhaustible one.

Of one thing, however, your worthy contributor can be assured, and that is that no concoction, however choice, will ever oust pure malt vinegar from the favour of the British public.

Yours faithfully,

THOS. MAINWOOD.

The PREPARATION of CANDIED PEEL

By JOHN ELSBURY

Lemon Peel

IN THE first place, care should be exercised in the choice of peel; much depends on the quality of the product in view. If a good, bright peel is desired, a sour lemon skin must be used. Peel prepared from sweet lemon skin is always opaque, while that from cross-fertilised fruit is rendered unsightly by the development of white spots and patches due to an insufficiency of acid to bring about complete inversion of the sugar present in the peel. However, much can be done to overcome this tendency by the addition of the right proportion of citric acid to the syrup. Use is sometimes made of sulphuric acid in this connection, but care must be taken that the correct amount is added, and that the acid is not employed in conjunction with sour skins, otherwise the resulting peel will be wet and runny, although this is not so important in the case of cut peel—in fact, it is an advantage to prevent it from drying too quickly.

Cut Peel.

Take ½ pipe of lemon skins (weight, 6 cwt.) and place them in cold water for 24 hours. Then cook for a time, depending on the nature of the peel. Run off the hot water and add cold water until the skins are quite cold. Now place the skins in baskets to drain, after which they are immersed in a cold syrup (8 cwt. of sugar to 48 gal. of water); bring to the boil and skim. Place in casks or tanks and allow to stand for 48 hours, turning over the skins at the end of 24 hours.

Draw off the syrup into the boiling pan; add 1 cwt. of sugar and boil to 220° F. After skimming, pour the solution back on to the skins and allow to stand for 48 hours, turning them over after the first 24 hours.

Draw off the syrup into the boiling pan; add 1 cwt. of sugar and boil to 225° F., and repeat the previous operations. Finally, drain the peel and cut it up.

The writer has found that ½ pipe of skins made 7 cwt. 2 qtr. 15 lb. of cut peel and 111½ gal. of syrup of 33 Be. when cold, leaving 52 per cent. of the sugar in the peel. Whitening of the peel was avoided by taking out the salt before cooking and then placing the peel direct in the cold syrup. Also, a better product is obtained in the case of cut peel by passing it through a rubber wringer before placing it in the cold syrup. Another advantage of this practice is that it saves sugar and economises in time and the amount of boiling; moreover, less colour is required. Some houses now pass all their skins through a wringer and cut them up in a raw condition before syruping. In the writer's opinion this is by far the best practice.

Thirty years ago the author made candied peel in Chicago by the vacuum process.

Syruping Lemon Peel.

Immerse ½ pipe of lemon skins in cold water for 48 hours, changing the latter two or three times, to ensure complete removal of the salt. Next cook the skins in a wooden cask fitted with a steam-coil of copper. Run off the hot water and add fresh water until quite cold, after which the skins are drained in a basket.

Place the skins in cold syrup (8 cwt. of sugar to 48 gals. of water). Bring to the boil, skim, and transfer to casks or tanks. Allow to stand 24 hours, and, after turning, draw off the syrup.

Run the syrup into pans and bring to boiling-point; after skimming, run it over the skins while hot and allow to stand 24 hours.

Then draw off the syrup into the boiling pans. Add 1 cwt. of sugar and boil to 220° F. Now return the hot syrup to the peel and allow to stand for 48 hours.

Again draw off the syrup into the boiling pans. Add

1 cwt. of sugar; boil to 225° F., return to the peel, and allow to stand for 48 hours.

Repeat these operations for the third time, raising the temperature of the syrup on this occasion to 230° F.

If a good lemon peel that will keep bright is required, the above operations should be repeated for the fourth time, boiling again to 230° F.

Drying the Peel.

Place the peel in baskets and drain, after which distribute them, cap up, on wire trays which are stacked in the drying room and there dried by hot-air circulation. In the case of lemon peel, the best range of temperature is from 95° to 100° F. over a period of 24 hours. The temperature should never be allowed to exceed 100° F., otherwise there is danger of darkening, due to caramelisation. Special precautions should be taken to prevent the peel, and even the air used for drying, from coming into direct contact with iron, if blackening is to be avoided. All metal parts should be enamelled.

Candying the Peel.

Make up a syrup of 9 gal. of water and 2 cwt. of sugar. Boil and skim. Then boil again until the temperature reaches 230° F. Place 56 lb. of lemon peel in a hand-pan and add enough of the boiling syrup to cover it. Now rub the side of the pan with a wooden spatule to start granulation, and turn out the peel with a wire scoop on to wire trays, and there spread out, cap up; allow to cool, and pack.

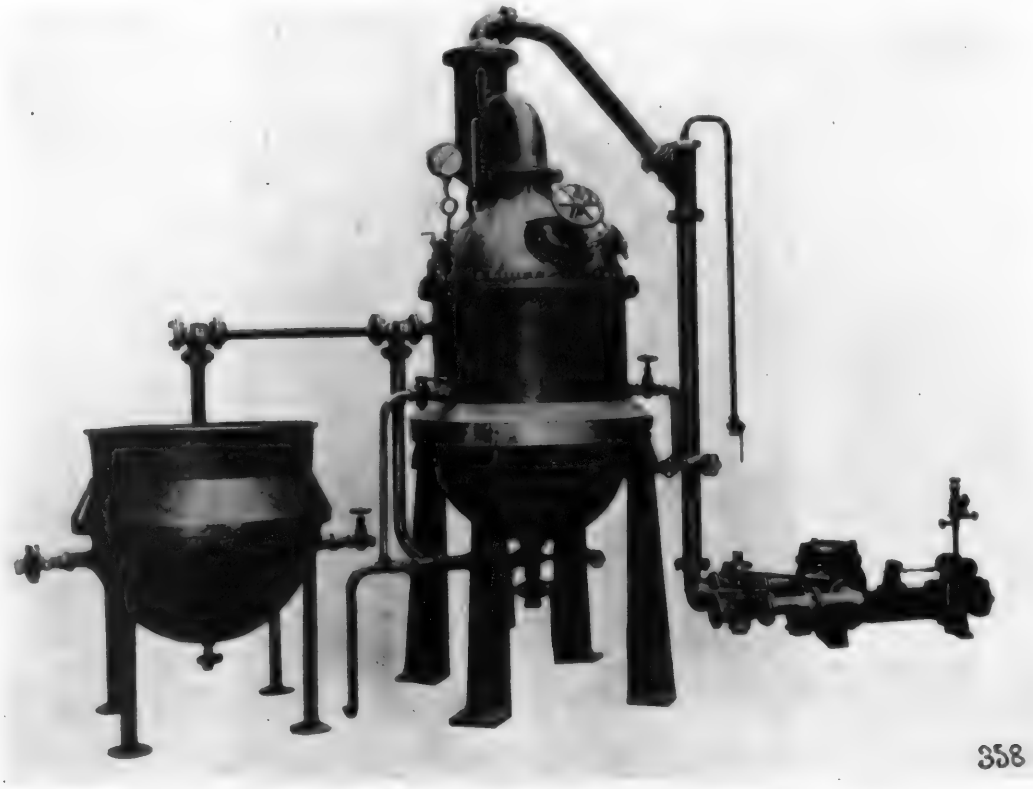
If the peel shows any white when it leaves the drying room, the following procedure should be adopted: Take 6 gal. of the syrup prepared according to the directions given above, and raise its temperature to 227° F. Then add the lemon peel and boil to 229° F., after which transfer the whole to a hand-pan and grain up until white. Now lay out the peel, cap up, on trays, and pack when quite cold.

Spad Lemon Peel.

The small kinds are candied as described above, but the large varieties require careful treatment. In the first place, they must be brined in a concentrated solution of salt prior to cooking. The use of a light brine will cause them to shrivel after syruping. Instead of 48 hours, each syruping period should be 24 hours. The best temperatures to employ are, in order, 220° F., 222½° F., 225° F., 227½° F., 230° F. It is advisable to give two syrupings at 230° F.

Orange Peel

If not well syruped, orange peel will go white much more readily than lemon peel. That prepared from



A Modern Vacuum Plant for Preparation of Candied Peel.

A new control fitted to the vacuum pump enables the latter to be used also as an air compressor for blowing the contents of the pan into any of the candying tubs.

(By courtesy of William Brierley, Collier and Hartley, Ltd.)

the sweet fruit is always opaque, but if the sour or bitter orange is used and the syruping is adequately carried out, a bright peel should be obtained. In this connection it should be noted that orange peel requires one more syruping than lemon peel, if good results are to be expected.

In many cases a white peel is caused by fermentation. The latter will set in if the peel stands for any length of time in cold water prior to the syruping operation. The writer finds by experience that fermentation is prevented by removing the salt from the peel and then boiling for, say, 25 minutes, after which it is immediately syruped. Also, it is most important to see that the syrups are always "sweet"—*i.e.*, free from all spoilage organisms. If they should become infected they must be boiled and filtered before use. A further point is the necessity for filtering each syrup before it is used.

Citron Peel

Citron peel should be kept well brined, and the last syruping operation should be repeated in order to increase both weight and brightness. In the case of cut or sliced citron, the peel should be cut or sliced in the raw condition before syruping. The syrup should be coloured a light green; do not try to colour the peel.

Whitening is due to fermentation. If this happens, the peel and syrup should be placed in a pan, boiled for a few minutes, and then returned to the cask and well covered.

A good quality cut peel should contain not less than 72 per cent. of sugar, but for the bakery trade the sugar content may be about 65 per cent.

Strict attention must be paid to brining. If not kept well brined (with a solution of 2½ lb. of good salt to the gallon of water), peels will darken and soften, in which condition they will not take the syrup and so result in a white product by the action of fermentation. It is useful to add a little SO_2. Finally, avoid all chances of contamination with iron.

Lemon Peel by the Vacuum Method

The writer has used the following method: ½ pipe of Messinas, cut in halves and brined, are boiled in a wooden vat fitted with copper steam-coil. They are afterwards placed in fresh cold water, pulped—*i.e.*, the centres removed and thrown away—and allowed to stand overnight. Next day they are twice immersed in fresh water and then placed in cold syrup made up of—

Water	...	...	...	30 gal.
Glucose	...	...	...	30 lb.
Sugar	...	...	...	300 lb.

boiled and skimmed in an open pan. There they are allowed to remain for 24 hours.

The syrup is then drawn up into the vacuum pan and boiled to 200° F., and run back while hot on to the peel. Syruping takes place for 48 hours.

These operations are repeated twice, first at 200° F. and then at 210° F. Thus there are three vacuum boilings at 200° F., 200° F., and 210° F. respectively, and three syrupings of 48 hours each.

The peel is then drained, dried, and candied. All kinds of peel may be treated in this way.

The writer treated 10 to 15½ pipes a day and found the vacuum process far superior to the open pan method. At the end of the season there were not more than 50 gal. of syrup, which was as clear as it was at the beginning. Peel prepared by the vacuum process was excellent in every way. Some glucose is necessary in order to avoid graining troubles.

A Guide to Food Appreciation

THIS journal is as a rule devoted to the science of food. But there is also an art, the practice of which we all admire and the appreciation of which we all hope to attain. Mr. Allan Ross Macdougall is an artist in food, both in practice and in appreciation. He is a Casanova of cookery, a Tafur of the table. He has scoured the culinary world for his conquests and records them as a labour of love. His recipes range geographically from Greenwich Village to Turkey and Algeria and chronologically from the fourteenth century, whence he has unearthed "chekyn for a lorde," to sundry delicate creations named after friends and celebrities of the present day, such as Crêpes Sophie Victor, and sundry tasty and odorous concoctions of the author, such as his omelette aux petits oignons. The practice of this last has considerably increased the reputation of the present reviewer as a gourmet and purveyor of good things, though, as Mr. Macdougall points out, it is most difficult to turn out of the pan successfully when cooked.

Let me recommend in particular a method of cooking rump steak with anchovies, collected from the Camargue, and a recipe for serving the hearts of artichokes covered with thin slices of ham.

With the recipes there are quotations, maxims, and aphorisms on culinary matters chosen with a wide and discriminate taste which travels from Brillat-Savarin to the Chinese sages. Best recommendation of all, they do not disturb or irritate the reader in the hunt for new recipes. Perhaps one could have done without Lamb's essay on roast pig, which occupies far too much space that might have been better employed in more recipes, as it is easily obtainable elsewhere. But this is a small criticism.

This book is to be heartily recommended to all those whom love of the art of cooking and of the good things of the earth place among the gourmets, and let us hope that the science of food manufacture will never extinguish the art of food preparation. (*The Gourmet's Almanac*, by Allan Ross Macdougall. London: 1932. 8s. 6d.)

The Bacteriology of Common Salt

By WILLIAM CLAYTON, D.Sc., F.I.C.,
Chief Chemist and Bacteriologist to Messrs. Crosse and Blackwell, Ltd., London.

A series of articles reviewing present knowledge in relation to the bacteriological action of salt.

PART VI.—THE SALTING OF BUTTER AND MARGARINE

SALT IS used as a preservative in butter and margarine and, although very little work has been reported on the latter foodstuff in this connection, the results obtained in the case of butter apply equally well.

The first point to notice is that the legal limit for moisture content in both cases is 16 per cent. Hence, if 1 per cent. salt is present, it can furnish a 6·25 per cent. brine, since it is only soluble in the aqueous phase. If 2 per cent. salt is used, the brine strength in the butter or margarine becomes 12·5 per cent. The salt should have a particle size of 0·025 to 0·0167 in. diam., so that rapid and uniform solution may obtain during "working" or kneading.* It is immaterial whether the salt be flake or cube crystal,† but it should be free from Ca, Mg and SO_4 ions.

Bacteriological considerations of the salt used in dairy work have been fully reported by the present writer elsewhere.‡ At the onset it should be realised that salt itself may carry infection (bacteria and moulds)§ and only heat-sterilised salt should be employed.

Before discussing the salt tolerant relations of the bacterial flora encountered in butter and margarine, mention should be made of the recent highly interesting investigation of Rahn and Boysen.‖ Since butter contains from 10 to 18 billions of water droplets per gram and since in butter from ripened cream there are seldom more than 50 millions of micro-organisms per gram (and in pasteurised sweet cream butter sometimes only 10,000 per gram), it follows that the majority of the water globules are bacteria-free. Churning produces sterile water drops. "Even in sour cream butter there are more than 100 droplets to one bacterium. In this case about 40 per cent. of the moisture, mostly the smaller drops, will become sterile. With pasteurised sweet cream butter more than 80 per cent. of the moisture remains free from bacteria." The more butter is overworked the more drops there will be which are sterile.

Assuming that the water drops in butter are interconnected with fine threads or channels of adsorption-membranes, salt should rapidly reach equilibrium solution-distribution in the droplets. Experiments prove this correct and Boysen* has made micro-motion pictures of the effect. While bacterial growth may thus be confined to only a portion of the total water or brine present, mould growth may be more extensive because of the ability to penetrate by means of the mycelium. However, when there is a separation of serum from the fat, the multiplication of bacteria is accelerated.†

Interesting data on the quantitative changes in the microflora of butter during storage have been recorded by Macy‡ relating to numerous samples of salted and unsalted butters kept for times varying from 5 to 12 months at (mainly) 32° to 35° F. He gives several tables from which the following is taken:

EFFECT OF SALT CONTENT ON CHANGE IN COUNT DURING STORAGE OF BUTTER.

Salt Content.	Total Samples.	Distribution of Samples according to Change in—								
		Mould Count.			Yeast Count.			Bacterial Count.		
		Increase.	No Change.	Decrease.	Increase.	No Change.	Decrease.	Increase.	No Change.	Decrease.
Per Cent.		Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
0·0	62	85·4	4·0	10·6	71·4	3·4	25·2	72·1	—	27·9
0·4–0·95	123	21·0	16·1	62·9	38·7	1·6	59·7	17·7	—	82·3
1·0–1·9	207	15·9	13·6	70·5	33·3	4·9	61·8	27·5	0·5	72·0
2·0–3·4	213	29·0	10·7	60·3	29·1	6·6	64·3	26·3	1·9	71·8

It will be seen that a sharp line of demarcation exists between salted and unsalted butters even when the salt content was less than 1 per cent. Macy points out "that there was no greater tendency for the more highly salted samples to decrease in count than for those of lower salt content," explaining this on the grounds that the majority of the organisms inhibited by salt show such inhibition when only relatively small amounts are present. Particularly was this true in the case of moulds, *Oospora lactis* being the principal type met with and one peculiarly susceptible to salt concentration. Thus, although the salt content of butter quantitatively changes the microflora of butter in storage, such effect is *not* proportional to the amount of salt employed.

Macy does not give details of the bacterial strains in his samples, but Muskoteu§ has published a de-

* Ramsay, *Agr. Gas., N.S. Wales*, **39**, 553-61 (1928).
† Hunziker, Cordes and Nissen, *J. Dairy Sci.*, **11**, 333-51 (1928).
‡ Clayton, *Le Lait*, **7**, 913-27 (1927).
§ Macy and Combs, Minn. Agr. Expt. Sta. *Bull.* **235**, 1-31 (1927); Rapin, *Milch. Ztg.*, **20**, 433 (1911); Weigmann, *Milch. Zentralblatt.*, **44**, 364 (1915).
‖ *J. Dairy Sci.*, **11**, 446-70 (1928).

* See reproduction in Rahn and Sharp: *Physik der Milchwirtschaft* (Berlin, 1928), S. 115.
† Hammer and Hussong, Iowa Agr. Expt. Sta. *Research Bull.* **134**, 19-30 (1930).
‡ *J. Dairy Sci.*, **13**, 266-72 (1930).
§ *Milch. Forsch.*, **9**, 51-87 (1929).

tailed account of the influence of NaCl on the bacteria of milk, showing that gram-negative bacteria are most susceptible to NaCl, spore-forming bacilli, lactic acid bacteria, and cocci less so. Using broth containing 20 per cent. NaCl, gram-negative bacteria and *Oidium lactis* soon died out, but bacilli and cocci attained an equilibrium condition.

Special interest of course attaches to the lactic acid species and the present writer has investigated the salt tolerance of *Streptococcus lactis*, using 2 per cent. lactose-agar with varying NaCl concentration. At 37° C. excellent growth occurred in the absence of salt and growth was also very good with 1 and 2 per cent. NaCl. A regular gradation, showing feebler growth, followed the use of further salt, the growth being very feeble when 10 per cent. NaCl was present. Giltner and Baker* studied the effect of NaCl on butter microflora and observed that 12 per cent. does not retard growth in all cases, while some bacteria withstand 20 per cent. NaCl. Sensitivity to NaCl was exhibited by streptococci, other coccal forms being much less inhibited. These authors put 8 per cent. NaCl as the concentration limiting the physiological activity of most bacteria.

The salt tolerance of moulds is important to the dairy technologist. Experiments by the present writer concerned: *Mucor mucedo*, *Aspergillus niger*, *Penicillium glaucum*, *Oidium lactis*, *Cladosporium herbarum*, and *Cladosporium butyri*. Using a paste of 10 grams breadcrumbs, 25 grams water, 0·2 per cent. citric acid, and varying amounts of pure NaCl, and working at 22° C., it was found that mould growth was restrained in regular gradation according to the concentration of NaCl. Total inhibition was observed when the NaCl concentration was 16 per cent. in the aqueous phase, incubation being carried out for 12 months. Such an effect to be obtained in butter or margarine of 16 per cent. moisture content demands 2·5 per cent. NaCl. The investigation of Thom* on the salt tolerance of the *penicillia* supports these findings, while extensive work by Fettick,† who inoculated salted sterile butter with pure cultures of micro-organisms, concluded with the recommendation of 3 per cent. NaCl as the safe preservative for general practice.

Fettick showed that the most sensitive organisms in relation to NaCl are *Oidium lactis*, *P. glaucum*, and *Mucor mucedo*. In butter containing 2 per cent. NaCl, the decrease in the number of colonies is very striking. 3 per cent. NaCl allowed growth only spasmodically, while 4 per cent. NaCl entirely restrained growth. Lactic acid bacteria are somewhat more tolerant to NaCl; butter containing 3 per cent. NaCl gave plate cultures showing quite a number of colonies, but 4 per cent. entirely inhibited lactic strains. *B. fragariæ*, *B. carotæ*, *B. lactis viscosus*, and *B. prodigiosus* tolerate salt better than the foregoing. These four species can be isolated from butter with 4 per cent. NaCl in rather greater numbers; the most luxuriant colonies furnish *B. lactis viscosus*, and *B. prodigiosus*. Still more tolerant to NaCl are *B. cyanogenous*, *B. lactis saponacei*, and *Streptothrix chromogena*. In 5 per cent. NaCl butter, there can develop *B. cyanogenous*; in 6 per cent. NaCl butter, the other two. Very salt-tolerant are: *B. coli*, *B. aerogenes*, *B. subtilis*, *B. putrificus*, and yeasts. Defects in butter flavour due to bacterial causes are prevented by about 2·5 per cent. NaCl, while above 3 per cent. NaCl is detrimental. This is an instance of the sorting out of strains, the higher NaCl concentration inhibiting the desirable lactic strains and permitting the objectionable micro-organisms to develop. Other workers‡ support these conclusions.

* Michigan Agr. Expt. Sta. *Report* (1915), p. 209.

* Storrs Agr. Expt. Sta. *Bull.* **79**, 387-94 (1914).
† *Centr. Bakt.*, **11**, Abt. **22**, 32 (1909).
‡ *Cf.* Hunziker, *The Butter Industry* (Illinois, 1902), p. 343.

THE FOOD GROUP

In view of the recent formation of a Food Group of the Society of Chemical Industry, and in order to avoid any additions beyond what is absolutely necessary to the already far too numerous scientific and technical societies, we have decided to refrain from proceeding with the formation of the Society of Food Industry as proposed in previous issues of this journal.

This decision has been arrived at after careful consideration of all the circumstances involved, and chief among these is the fact that the Society of Chemical Industry, founded in 1881, is the national body representing the chemical industry on its technical side, and that in 1919 a Chemical Engineering Group was formed which has since enjoyed a successful career. One naturally anticipates, therefore, that a similar measure of success will attend this second offshoot, the Food Group, sponsored as it is by the parent society with all its experience and prestige.

For these reasons it appeared to us that the object we had in mind—namely, that the time had arrived for the food industry to have its own technical society—would best be met by the Food Group of the S.C.I., in fact, it could not be in better hands.

Originally there was always the possibility of a less responsible body being concerned in the matter. Accordingly we felt that when the Food Group was formed our object was achieved in the most desirable manner possible, and we are happy in being able to join forces following on a cordial discussion of the matter.

Thus the position is now reached at which we are pleased to advise all of our readers who expressed themselves as being in sympathy with our original project, to join the Food Group of the Society of Chemical Industry and to communicate with the Hon. Secretary at 46, Finsbury Square, London, E.C. 2. We understand that an attractive programme of meetings, papers, works visits, etc., has been arranged for the immediate future, from which we feel sure readers of FOOD MANUFACTURE *will derive the greatest benefit.*

A DISCUSSION ON VINEGAR BREWING

To the Editor.

DEAR SIR,

As a manufacturer of vinegar I was most interested in your article on vinegar and wish to congratulate your authors on a most concise yet comprehensive article. It is a considerable achievement to have explained the fundamentals and described the operations of vinegar brewing in so brief and lucid a form.

If one may attempt anything in criticism, I would refer to the acetifying organism *Mycoderma aceti*. This is an old generic term, really quite out of date, and refers generally to what is known as mother of vinegar. Acetification is performed by quite an extensive group of vinegar bacteria, comprising several races or varieties, some of which are visible as a skin or film on wine, some as a jelly-like mass, others merely by turbidity. Again, the ordinary variety would fail to function in the D.C.L. acetifiers at Hull.

I was glad to see that your authors acknowledged some of the difficulties and losses with which a vinegar brewer has to contend in the actual acetification process, and I think further credit might have been given for the long periods required for maturing. The vinegar brewer keeps tremendous stocks of vinegar on hand to mature, all of which involves capital outlay, and allowance should be made for this before accusing him of charging too high a price for his product.

With reference to filtration, I was somewhat surprised at the impunity with which your authors used metal in contact with vinegar. Tinned copper or gun metal is not sufficiently resistant to vinegar in movement, and that is my only objection to the filter described, although I certainly must protest against the assertion that the filtrate will be sterile. The vinegar bacteria are too minute to be retained by a pulp filter, and for the same reason it is unlikely that a centrifuge would remove vinegar bacteria, in addition to which one has again the difficulty with the metal of the centrifuge.

The safest plan in the manufacture of vinegar is to avoid metal of any kind unless you are certain of its resistance. Wood, vulcanite, glass, and earthenware are all available, but the only suitable metal for vinegar is pure solid silver.

Yours faithfully,
G. W. HYDE.

THE SWAN BREWERY,
ARDWICK,
MANCHESTER.
June 17, 1932.

To the Editor.

DEAR SIR,

We are indebted to your correspondents for their kind remarks about our article on the manufacture of vinegar, and appreciate the friendly nature of their criticisms. If we may be allowed to comment on their remarks, we would remind readers that the very fact that Messrs. Hyde and Mainwood differ as to the actual losses occurring during acetification illustrates the difficulty with which one is confronted in trying to reduce into a small space all the information at one's disposal. When comparing our notes during the preparation of this article we found that we differed among ourselves, and decided to take the average loss in order best to express what usually occurs in a vinegar brewery. We are aware that in one or two breweries many of these difficulties have been overcome, and that the whole process may be, and has been, reduced to an automatic one, but this is still far from the case in most. Doubtless with the large amalgamations taking place in the vinegar trade full advantage will be taken of recent research, but, even where this is the case, processes are usually kept secret to a considerable extent.

With regard to the term *Mycoderma aceti*, we again recognise that many different strains of bacteria are employed both in this country and abroad, but, for the purpose of an article, we are of opinion that it was best to keep to the old generic term. Mr. Hyde is no doubt aware that even now there is considerable discussion among bacteriologists as to how many different strains of bacteria exist. To quote only one favourite example. What is the difference between smallpox and cowpox, the organism employed in vaccination? Are these in reality two distinct strains of bacteria, or has one become attenuated in the cow, while the other is virulent in man? If they are different, then why does treatment with one immunise against the other?

In the matter of filtration we are afraid that we must disagree with Mr. Hyde. If a pulp filter is properly prepared, it is a bacterial filter, and in this connection we may remark that most of the insulin marketed in this country has probably been sterilised by passing through a pulp filter. We ourselves have employed pulp filters extensively for bacterial filtrations.

Again, we must disagree with Mr. Hyde as regards the use of a centrifuge for removing bacteria. Where any difference exists in gravity, provided the centrifugal force is great enough, separation may be effected to a greater or lesser extent. Centrifuges are used extensively at the present time for the separation of yeasts, bacteria, and blood cells.

If Mr. Hyde objects to any other metal than silver coming into contact with vinegar, there is no reason why he cannot silver-plate his plant. We had a centrifuge bowl silver-plated nearly ten years ago on account of certain processes in which we were engaged, and it proved quite satisfactory. Of course, the silver gets slightly scraped in cleaning the bowl, but it lasted a considerable time. Provided that good block tin is employed, we cannot see any objection to its use for vinegar plant. The trouble is that brewers frequently do not keep an eye on the tinning to note when it is beginning to wear, and in consequence electrolytic action sets up between the tin and the copper when both are exposed. Again, provided that contact is not too prolonged, we cannot see the objection to the use of nickel, while aluminium is now being recommended as the metal, almost *par excellence*, for brewing vats during alcoholic fermentation. Corrosion frequently obtains a footing in plant, because vessels are not kept clean and polished, or because, when they are cleaned, proper precautions are not taken. Too frequent use is made of sand for tinned copper vessels, even in conjunction with hydrochloric acid.

There are various objections to the use of wood in a brewery for fermenting rounds. We ourselves do not agree entirely on this point, but wood appears to be the commonest material of construction at the moment, and it was for this reason that its use was so fully explained in the article. No doubt glass or transparent silica are the idea materials, but one has to consider not only the initial outlay, but the cost of upkeep, due to the dropping of crowbars and similar implements into vats. Even though the employee concerned be dismissed in such events, the broken article must be replaced, while the brew itself may be entirely lost.

Yours faithfully,
W. WARREN.
T. MCLACHLAN.

BRITISH MACARONI

To the Editor.

DEAR SIR,

In your issue of July the subscriber was very interested to read the suggestion on British macaroni.

Probably it might interest your correspondent to know that this is not the first time this suggestion has been made to important British manufacturers of foodstuffs, but that in every direction the proposal has been turned down with such remarks as: "Busy in other directions; know nothing about it; do not think there is a large enough market" (general indifference due, probably, to a lack of the younger energetic blood in some of the older firms); "conditions do not permit an experiment;" and very many more equally unsatisfactory answers. All the answers and efforts attempted so far have resulted in nothing.

This attitude of important interests is just why many British patents are sold abroad and finally come back to us in their completed states as "best sellers."

Your correspondent, however, is in error when he states that no macaroni is manufactured in the U.K. It is done in a small way in St. Albans, and for domestic sales the subscriber has seen it made and sold daily over the counter in Soho. It is, however, not really produced and manufactured in a sound commercial manner in the U.K., although at one time it had been hoped that one of the Australian manufacturers would establish a factory at Watford; but this did not materialise, although considerable correspondence and conversation were entered into with the subscriber. The Continent was searched for the manufacturers of the best plant, catalogues were closely examined, and even second-hand machinery was offered. In your issue of July it is noted with interest that a company has been formed at Welwyn to manufacture macaroni, and we believe that, if it is done on a proper basis, success is assured.

The subscriber doubts if there are many in London to-day who have any idea of the quantity of macaroni imported in its many forms and with the necessary ingredients, and, surely, with the small capital outlay involved, this is a food product which can be successfully manufactured and sold in the U.K. to the exclusion of Russian, Belgian, French, Dutch, American, and Italian macaroni.

I believe that the U.K. is the one and only important country in which macaroni is not manufactured in a commercial manner, and why this is so I am at a loss to understand.

As manager for the Grain and Cereal Department of Messrs. Armour and Co., Ltd., from 1919 until the end of 1926, the subscriber believes that during that period his former company was the first to introduce to the British public macaroni under the designation of "noodles," but since then quite fair shipments have been received in the U.K. of "plain noodles" as well as "noodles with egg."

In addition to the macaroni from the countries above named, importations have been made from Malta, from the Argentine, and other points, and at one time it seemed as though Canada was really going to come into the limelight as the principal shipper to this country.

British millers export large quantities of the semolino to the Continent for macaroni, which when manufactured has found its way back to the U.K.

Yours faithfully,
CHAS. HOGG MARTIN.

TRADE NOTES

Chocolates and Confectionery at Olympia.

Olympia will again be the venue of the fifth annual Chocolate and Confectionery Exhibition from 31st of this month to September 8. The Empire Hall, the latest and best-equipped addition to Olympia, will be occupied by the exhibition, the largest display of chocolate and confectionery goods ever shown under one roof, covering an area of 200,000 square feet and several miles of gangways. It should be borne in mind that the number of employees engaged directly in the manufacture of chocolate and confectionery is about 100,000 and it has been ascertained that there are about 250,000 selling points with a turnover, on a retail basis, of approximately 50 million pounds per annum.

Exhibits of machinery and trade supplies, which have been well supported by manufacturers, have always been a prominent feature at each exhibition in the past, and this year the entire ground floor has been devoted to this section of the trade; the latest types of machinery will be shown in operation.

* * *

Prize Contests for National Mark Flour.

At the Confectioners' and Bakers' Exhibition to be held at the Royal Agricultural Hall, Islington, September 3 to 9, the Ministry of Agriculture is offering three prizes of £10, £5, and £3 respectively in the special class for 2-lb. commercial tin loaves made wholly with All-English National Mark flour. Competitors must give a guarantee that the bread is made wholly from All-English National Mark flour, and that none of the other ingredients (yeast, etc.) is of foreign origin. They must also give an assurance that bread made from National Mark flour will be obtainable on application to their business premises and that such bread will actually be on show and sale in their shops during the period of the exhibition.

The Ministry is also offering gold, silver, and bronze medals, with diplomas, for the three best entries in the class for National Mark All-English (Yeoman) flour, open only to authorised millers, in the British Wheat Flour Competition at the exhibition, and a gold medal to the farmer providing the largest proportion of wheat used in the winning flour. The flour must be milled solely from Yeoman wheat grown in England and Wales and must comply with the standards of quality required for All-English (Yeoman) flour packed under the National Mark. Entries must consist of three bags of flour of 7 lb. each; one 2-lb. bag of the wheat used must be sent in.

The National Farmers' Union is offering three prizes of £10, £5, and £3 respectively for the best 1 lb. All-English commercial milk loaf (tin) made from National Mark flour.

* * *

I.F.S. Regulations.

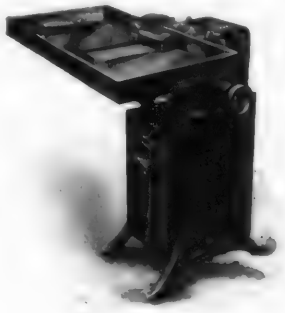
Food manufacturers are reminded that the Merchandise Marks Act (I.F.S.) is now in operation. Accordingly, it will not now be lawful to sell or expose for sale in the Irish Free State goods, either wholesale or retail, or to distribute by way of advertisement, any imported goods to which there is applied: (*a*) The name of a manufacturer, trader, or dealer in the Irish Free State; or (*b*) the trade-mark of any such person or any mark, emblem, or device so closely resembling such trade-mark as to be calculated to deceive; or (*c*) a name so closely resembling the name of a manufacturer, trader or dealer in the Irish Free State as to be calculated to deceive; or (*d*) the name of any place, district, or area in the Irish Free State, unless such name, trade-mark, mark, emblem, or device is accompanied by a definite indication (such as "Made in England") of the country in which such goods were produced or manufactured.

In the absence of a specific order by the Ministry of Industry and Commerce these provisions do not extend to imported blends or mixtures.

* * *

Peel Cutting.

Below is an illustration of Messrs. Wm. Brierley, Collier and Hartley's Patent Drained Peel Cutting Machine, "Turnbull" type, for the cutting of orange, lemon, and citron peel into square or oblong shapes.



* * *

Soviet Canning Industry Lags.

According to information contained in the June 1, 1932, issue of the *Economic Review of the Soviet Union*, the output of canned goods during the first quarter amounted to 46,292,000 cans, as against the programme of 68,100,000 cans. The plan for canning meat was only 59 per cent. fulfilled and that for fish 56 per cent. The schedule for canning baked beans was exceeded by 4 per cent.

* * *

National Mark Honey.

The Agricultural Produce (Grading and Marking) (Honey) Regulations, Statutory Rules and Orders, 1932, No. 483, were made by the Minister of Agriculture and Fisheries on June 17, 1932, and copies may be purchased from His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C. 2, price 1d. net.

These Regulations prescribe grade designations — viz., "Select" or "Select Section," and grade designation marks for the grading and marking under the National Mark Honey Scheme of honey produced in England and Wales.

Full particulars of the National Mark Honey Scheme and of the procedure and conditions to be observed by individual packers or associations of bee-keepers authorised to apply the National Mark are contained in Marketing Leaflet No. 31, copies of which may be obtained free of charge on application to the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W. 1.

* * *

Change of Address.

The Royal Institute of Public Health has recently removed from its old Russell Square premises to new accommodation at 23, Queen Square, Great Ormond Street, W.C. 1.

* * *

Grease or Lard?

Some Dutch manufacturers have, apparently, been in the habit of employing hog fat imported from the United States for the production of an article which the manufacturers term "pure white lard." As the fat used as a raw material had previously been classed by the U.S. Government as unfit for human consumption, the American Departments of Commerce and Agriculture have issued a formal protest to the Netherlands Government. The latter has replied that it is satisfied that the finished product is one quite fit for human consumption and therefore declined to take action. There, for the time being, the matter rests.

* * *

Malt Extract for Bakers.

In connection with a trade note which recently appeared on the uses of

malt extract in bakeries, Messrs. Boake, Roberts and Co., Ltd., inform us that they are able to supply this product in either liquid or powder form.

* * *

Bakers' Exhibition.

The folowing judges will officiate at the Bakers' Exhibition, which is to take place this year at the Royal Agricultural Hall, London, from September 3 to 9.

Bread Section.—Messrs. S. Bamford, London (Chairman); T. H. Baines, Birmingham (Vice-Chairman); E. Harding, Birmingham (Arbiter); H. Bamford, London; G. A. Beaton, London; E. C. Bell, J.P., Sheffield; W. T. Broadis, London; W. A. Broom, Sheffield; O. H. Burden, Worcester; A. J. Clark, Hove; E. Coleman, J.P., Margate; W. Collier, J.P., Leigh, Lancs; B. Fisher, Liverpool; A. V. Larcombe, Swansea; J. H. Merrett, Cardiff; P. H. Moll, London; W. H. Palmer, Swansea; W. H. Pratt, Cambridge; H. A. Sapsford, London; A. Sargeant, London; B. Smith, Weymouth; G. Warburton, Bolton; W. H. Wigley, Derby; G. A. Witts, Bristol; and E. H. Wright, Wallasey.

Confectionery Section.—Messrs. G. H. McKay, Livcerpool (Chairman); F. Starkey, Birmingham (Vice-Chairman); J. Arscott, Bexhill-on-Sea; A. G. Bromley, Barnstaple; W. J. Chalkley, Woodford; A. R. Childs, London; G. E. Hoare, Chesterfield; R. J. Hollingham, London; J. J. N. Mackman, Hull; A. J. Morgan, Port Talbot; F. Newens, London; F. Nott, Letchworth; G. A. Stapleton, Leeds; S. H. Stanton, Hednesford; Ald. S. Stephens, J. P., Plymouth; H. G. Stiles, St. Ives, Hunts; and E. Taylor, Bath.

British Wheat Flour Competitions.—Messrs. F. Nevill Jennings (H. W. Nevill, Ltd.), London (Chairman); F. L. Bristow (E. and J. Fountain), Uxbridge; J. Percy Clover (Clovers, Ltd.), Dedham; Sir Albert Humphries, LL.D. (Coxes Lock Milling Co., Ltd.), Weybridge; T. H. Baines, Birmingham; and W. H. Soundy, Reading.

* * *

Pest Control.

A useful collection of hints and notes on the destruction of insect pests, with particular reference to pyrethrum as an insecticide. This is one of the all too few trade publications which give *really useful* information, and we heartily commend it to all who are in any way interested in the control of pests. Would that more firms could grasp the importance of service of this kind! The illustrated notes on the life histories of some of the chief insect pests, with their habits and host plants, cannot fail to interest users; the same may be said of the spraying charts. Others will do as we have done—file it for any future reference on the subject, instead of consigning it to the waste-paper basket—and, incidentally, we shall think of "Stafford Allen" each time this subject comes up for consideration. Another case of mutual service! (*Rational and Economic Pest Control. Issued by the Technical Laboratories of Stafford Allen and Sons, Ltd. London.*)

* * *

FOOD MANUFACTURE "Vital."

Writing from South Australia to take out a subscription to FOOD MANUFACTURE, the Blackwood Cold Stores, Ltd., inform us: "It is vital we should receive FOOD MANUFACTURE regularly. The article on page 133 of the May issue is just what we have been looking for, for ourselves and our foremen alike."

The company has a recently established but thriving jam-making branch, and in sending us some of their labels, which are certainly quite up to the home standard, add that they have already disposed of their whole output for this season. Marmalade, quince, apricot, melon and lemon, and light fig are among the jams packed in 1½-lb. tins, though a glass pack is to be put up later. Blackwood is in the centre of an extensive fruit growing and exporting region, which seems to have bright prospects as a fruit-canning centre.

* * *

Canned Goods on the Gold Coast.

The market for canned foodstuffs in the Gold Coast of West Africa is important, imports of such goods having averaged approximately £675,000 in value annually for the last six years. In 1926, when the cocoa market was experiencing a boom, they amounted to £559,899, and in 1928, to £907,599, total imports exceeding £12,000,000. In 1929 canned foodstuffs imported were valued at £733,922. In 1931, however, because of the steadily decreased purchasing power of the community, all types of importations decreased, amounting to only £4,353,328, of which only £365,834 belonged to the canned foods class.

From 1923 to 1928 total imports increased from £8,448,862 to £12,200,045, or by approximately 44 per cent. Those of canned foodstuffs, however, increased from £425,808 to £907,599, or by 113 per cent. The demand for imported canned foodstuffs was increasing rapidly when the boom period came to an end. Since 1928 the imports of canned foodstuffs have decreased by 60 per cent, but these commodities now represent 8·4 per cent. of the total imports, while in 1923 they accounted for only 5·0 per cent.

Cocoa the Principal Product—Value of Imports.

The Gold Coast Colony is primarily an agricultural community in which the main efforts are devoted to the growing and marketing of cocoa. This product has become all important, with trade gravitating about it. Cocoa is the only cash crop in the colony and accounts for more than 75 per cent. of the valuation of the country's exports. Trade is brisk when a high price is obtained for cocoa, and a rise or fall in the price of cocoa is reflected in the imports. At present, cocoa prices are near record low levels and trade in general is very dull.

VALUE OF IMPORTS OF CANNED FOODSTUFFS INTO THE GOLD COAST*

Item.	1930.	1931.
	£	£
Biscuits and cakes in tins	37,737	15,763
Aerated mineral waters and fruit juices ...	29,785	7,287
Butter	17,749	13,779
Butter substitutes ...	1,649	1,019
Lard and lard substitutes	14,256	7,585
Edible oils	26,959	16,799
Coffee (not raw)	3,950	2,894
Fish:		
Canned or preserved	182,426	94,431
Dried, salted, smoked or pickled	83,687	58,218
Fruits, canned or bottled, jams, jellies, or fruit preserves	5,777	4,483
Meats:		
Beef and pork, pickled or salted	81,872	53,338
Canned and bottled	104,431	42,548
Milk	43,937	29,817
Pickles, sauces, and condiments	3,590	3,211
Vegetables, dried, canned, or preserved ...	8,288	6,492
Confectionery	14,504	8,107
Total	660,597	365,834

* The figures for 1930 were taken from the Annual Trade Reports. Those for 1931 are from the *Gold Coast Gazette*, Trade Supplement, and include only Maritime imports. The 1931 figures are subject to alteration. Parcel post and overland imports generally amount to 10 per cent. of the total import trade.

* * *

New Vegetable Parchment Mills.

A new vegetable parchment mill is to commence operations at St. Mary Cray, Kent. The style of the new concern is Vegetable Parchment Mills (Delcroix), Ltd., with a nominal capital of £105,000 in £1 shares, and it is being sponsored by Messrs. Wiggins, Teape and Co. (1919), Ltd., in conjunction with a Belgian concern.

* * *

We regret to announce the death of Mr. Leonard John Pointing, the senior partner of the firm of L. J. Pointing and Son, the well-known colour manufacturers, of Hexham-on-Tyne. The business will be continued under the same name by his son, Mr. L. J. Pointing, who has been actively engaged in its administration for many years.

INFORMATION and ADVICE

ON ICE CREAM WITH VITAMINS—VEGETABLE BRINING—GRAVY SALT—ESSENCE OF CHEESE—USE OF EGGS—TOMATO OIL—CITRIC ACID IN CANNING—SPOILAGE—VACUUMISING OF GLASSES—PRESERVED GINGER

Ice Cream with Vitamins.

746. *We are asked if we can supply an ice-cream powder containing vitamin D. We understand that this vitamin is sometimes added to fresh milk, and presume, therefore, that it is a marketed article. We should appreciate any information that you could give us in this matter and also any source of supply.* (Middlesex.)

So far as we can say, no experimental work has been done in connection with the incorporation of vitamin D into ice-cream and ice-cream powders, but there seems to be no obvious reason why this should not be a practical proposition. It would seem that the best way to approach the problem would be to make a solution of the pure crystalline vitamin in some edible oil and then to incorporate the required quantity of the oil solution with the milk or cream used in making the ice-cream, or, alternatively, the oil solution could no doubt be mixed with the ice-cream powder. The pioneer manufacturers of vitamin D in this country are the B.D.H., Ltd., and during the last few months they have produced, on a commercial scale, vitamin D in pure crystalline form with the enormous activity of forty million international antirachitic units per gramme. The price of this crystalline vitamin D is about £5 per gramme. Good summer butter has an activity of about two international units of vitamin D per gramme, so that it is not difficult to make a calculation as to the quantity of the pure crystalline substance required.

The use of vitamin D for manufacturing purposes is covered by the Steenbock Patent. It is necessary for all manufacturers to obtain a licence, and this involves the payment of certain royalties. The power to grant licences under the Steenbock Patent is vested in Messrs. Joseph Nathan and Co., Ltd., 56, Osnaburgh Street, London, to whom application must be made.

747. *Kindly give us names of makers of pear peeling and halving machines. As fruit canners, we are definitely interested in all types of can making and fruit canning machines.* (Natal.)

Particulars were furnished.

748. *Could you please inform us of a manufacturer who could supply us with a large sand hourglass, mounted so that it can be reversed by hand after a period of five minutes?* (Liverpool.)

Suggestions were made.

749. *Wanted, name and address of an agent in this country for strawberry purée bottled by Moureaux Frères, of France.* (Surrey.)

Suggestions were made.

750. *We should be obliged if you would give us a recipe for curing cherries.* (Ireland.)

It is unsatisfactory to give a "recipe." An article is being prepared on this subject for early publication in FOOD MANUFACTURE.

751. *Kindly give references to books dealing with the manufacture of fruit essences.* (Lima.)

There is, so far as we know, no satisfactory book on this subject. A book on flavouring materials by H. S. Redgrove is shortly to be published. We have an article on the preparation of fruit essences which is awaiting publication in FOOD MANUFACTURE.

752. *Kindly supply the names of firms making machines for peeling pickling onions; also machines for cutting up vegetables.* (Kent.)

Suggestions were made.

Vegetable Brining.

753. *Kindly give information on the brining of lemon, orange, or citron skins, and of onions, gherkins, and cauliflowers.* (London.)

As regards citrus peels, reference should be made to the article in the present issue. For both "fed" peel and skins a saturated brine is used. (At 60° F., 100 lb. of water dissolve 36 lb. of salt to form a saturated solution.) The salt is put in a basket, which is immersed in the tank of water and allowed to dissolve. It is very important to avoid even traces of iron, otherwise blackening will occur. For citron peel use only brine, for lemon peel a little sulphite of lime, and for orange peel a little SO_2 are added. For orange and lemon skins an addition of metabisulphite of potash is made. Care should be taken not to use sulphites for citron skins, otherwise they will be turned a vivid green.

The procedure with regard to onions depends largely on the type of onion under treatment. About 40 lb. of salt per 50-gal. cask may be used for English and cutting onions, whereas only about 14 lb. of salt may be used for Egyptian onions, but, in addition, the latter require about ¼ gal. of 80 per cent. acetic acid. In each case about ¾ lb. bisulphite of soda is used. A second brining is usually carried out.

Some 14 lb. of salt and 2 oz. benzoate of soda per 50-gal. cask might be used for gherkins.

Cauliflowers are more difficult to brine. Here, about 20 lb. of salt is used, and the first brining takes about 5 to 7 days. After running off the brine, the cauliflowers are properly packed into another cask, and rebrined with a solution of 1 lb. of salt to 1 gal. of water. A little bisulphite of potash is used.

754. *We shall be glad if you will kindly advise us the names of firms who make plant for the manufacture of marmalade.* (London.)

This information was supplied. We recommend you also to consult the May and June, 1930, issues of FOOD MANUFACTURE, which contained two articles dealing with the manufacture of marmalade.

755. *Could you kindly recommend us a general textbook and a good laboratory manual on oils and spices?* (Liverpool.)

See answer to Enquiry No. 751. Clarke's book, *Flavouring Materials, Natural and Synthetic*, is useful.

756. *Kindly put us in touch with an English firm making a reliable labelling machine.* (Birmingham.)

This was done.

757. *Please inform us where colourings suitable for pastes, as indicated in your June issue, can be purchased.* (Glasgow.)

Names were furnished.

758. *Kindly give us the address of the Imperial Machine Co.* (Yorkshire.)

This was done.

759. *Please let us have the names of the manufacturers of jam jar lids similar to the sample supplied.* (Sunderland.)

Suggestions were made.

760. *Can you supply any information with regard to pump similar to the "Viking Pump"?* (London.)

The makers appear to be the Viking Pump Co., of Cedar Falls, Iowa. Apparently they have no British agents. The pump is of the rotary type, supplied only for electric drive, the motor being mounted on the same base-plate as the pump, which is self-priming and said to give constant delivery.

Gravy Salt.

761. *Can you give us a recipe for a brown gravy salt for thickening and flavouring gravies?* (Dundee.)

We had a note on this subject in the May, 1931, issue. We are not sure whether you refer to gravy powders or gravy salt. The essential ingredients are salt; a thickener such as cornflour, potato starch, sago starch, or some other cereal starch; colouring matter in the form of caramel. Some gravy salts are placed on the market without any thickening agent and may simply consist of, say, 1 part caramel and 5 parts coarse ground salt. Coloured starch is also available without any salt addition, and endless variations are offered. Some contain an addition of yeast extract, meat extract, or a glutamate preparation. Others are complicated mixtures of cereal flours, onion powder, vegetable extract, salt, caramel, and vegetable powders and seasonings.

762. *Where can we obtain a pure coffee extract in dry powder form?* (London.)

Suggestions were made.

763. *We should be very glad if you would put us in touch with manufacturers of plant suitable for making concentrated coffee essence and mixing it with condensed milk and then filling into tins.* (Ireland.)

Full particulars were given.

764. *Kindly supply a recipe for preventing fermentation in apples when making mincemeat.* (Lancashire.)

Reference should be made to a note on preserving apples for mincemeat which appeared in the last issue. The manufacture of mincemeat will be dealt with fully in a forthcoming issue of FOOD MANUFACTURE.

765. *Kindly give me the name of a firm supplying pectin for jam making.* (Lancashire.)

This was done.

Essence of Cheese.

766. *We should be obliged if you could ascertain if there is any information anywhere regarding a strong essence of cheese—a synthetic product. Also, can cheese be obtained in a dry powdered form?* (Glasgow.)

So far as we know, no one has yet succeeded in producing a satisfactory essence of cheese. Cheese can, of course, be dried to any extent, but there is a limit set by the loss of flavour—in the end one would obtain a moisture-free powder (like casein) which would be no use for flavouring purposes. A strong cheese partly dried is used for flavouring biscuits, etc. A cheese paste having a certain vogue in America is made by the emulsification of cheese, butter, and milk, aided by the incorporation of lecithin.

767. *Please let me know of any useful publications concerned with biscuit manufacture.* (Torino.)

There is nothing really satisfactory from a manufacturing point of view beyond Bennion and Stewart's *Cake Making.*

768. *We shall be glad if you will let us know the name of any English manufacturer of sodium glutamate, with which we see you supplied an enquirer in your July issue.* (Midlands.)

This information was furnished.

769. *Can you put us in touch with suppliers of horseradish?* (Wales.)

Suggestions were made.

770. *Could you please give me the address of an English firm making an onion peeling machine?* (Lancashire.)

Names and addresses were supplied.

771. *Kindly supply names of firms who handle West Indian Canned Grapefruit.* (Wales.)

Suggestions were made.

Use of Eggs.

772. *We wish to make profitable use of a surplus of eggs. Kindly give suggestions.* (Yorkshire.)

It is impossible to answer this question without a full knowledge of all relevant circumstances. Eggs may be dried, preserved, used for lemon curd, mayonnaise, etc. One would have to know the quantities available, financial resources for special plant, and so on.

Tomato Oil.

773. *Kindly give us any information on tomato seeds.* (Wales.)

The following is some general information obtained from Italian sources:

The skins and seeds removed from tomatoes prior to the canning process, and which represent about 4 per cent. of the weight of the entire fruit, were formerly employed as a cattle feed without further treatment or alternatively utilised as a fertiliser. At the present time, however, these by-products are treated in special oil extraction presses, the dried seeds being separated from the skins by means of machines analogous to those employed in the treatment of grain, the resulting polished seeds being expressed to yield an oil of a beautiful yellow to orange colour. This oil may be employed without further treatment in the paint and soap industries as well as for the curing and seasoning of cheese, while the refined oil is suitable for human foodstuffs.

774. *Where can I obtain the following:* (1) *Powdered charcoal for medicinal and dentrifrice purposes;* (2) *maple syrup;* (3) *apple pectin?* (Gloucestershire.)

This information was supplied.

775. *Kindly supply name and address of a firm who makes spring clips to hold the cap on vacuum fruit bottles during processing.* (Yorkshire.)

Names were supplied.

Citric Acid in Canning.

776. *Can you give any information on the use of citric acid in connection with canning fruits of low acid content?* (Midlands.)

It has been suggested that the loss from hydrogen swells may be reduced if a small quantity of citric acid is added to the syrup when canning fruits of low acidity. Apparently, about 0·2 to 0·5 per cent. citric acid gives the most satisfactory

results. Some authorities state that lemon juice has certain advantages over citric acid. (See article in present issue.)

For full particulars on this subject you should consult Kohman and Sanborn, *Industrial and Engineering Chemistry*, 1930, p. 615, also Morris and Bryan's *Food Investigation Report*, No. 40. In the *Food Industries Manual* you will find some particulars on pp. 114 and 156.

777. *I am requiring the name of a supplier of waxed boxes similar to those used for the packing of potted meat.* (Notts.)

Suggestions were made.

778. *Will you kindly ask Messrs. Jagenberg, Ltd., to let us have particulars concerning their container sealing machines?* (Ireland.)

This was done.

Spoilage.

779. [*A reader gave us a long account of his troubles arising out of fermentation of his various speciality preparations and wanted to know the cure.*]

You can hardly expect us to give information in the course of a letter on the many fundamental questions which you raise. You probably do not appreciate the number of fine points which are involved. We would recommend you to study some general treatise so as to familiarise yourselves with the principles of sterilisation, food spoilage, habits and distribution of moulds, the elements of bacteriology, influence of sugar concentrations, the influence of various percentages of acid on retarding spoilage, the presence of certain forms of bacteria in unrefined sugar, and a number of other subjects of general importance to the person who is setting out to manufacture foodstuffs.

You will readily appreciate that general information of this kind cannot really be discussed in a letter.

If you will refer to the back numbers of this journal you will find that we have given information on all these points and many others.

You will find, also, that we have given a considerable amount of information on the subject of lemon curd in the May and August (1931) issues of FOOD MANUFACTURE, and we would refer you to these articles. We have also given a considerable amount of general information (including the manufacture of lemon curd) in the *Food Industries Manual*.

As regards your question about milk, no addition of preservatives is allowed. In order to prevent spoilage, milk is either pasteurised or kept in cold storage.

As regards the other question about condensed and dried milk, much depends on the particular conditions under which these materials are stored, and also the particular ingredients with which they are associated. Generally speaking, however, one might say that probably condensed milk would keep better than dried milk, but here again there is a distinction between unsweetened and sweetened condensed milk. Dried milk is liable to rancidity, and should be kept in air-tight vessels, but all foodstuffs are liable to become attacked by mould, oxidation, and so forth, and it is by the application of the principles of sterilisation and of sugar, salt, acid, concentrations, and of the elements of hygiene, that one endeavours to resist this.

780. *Will you kindly give us formulæ for the preparation of salad creams?* (Middlesex.)

Mere formulæ are unsatisfactory. This subject will be fully discussed in a future issue.

781. *Will you kindly inform me of the makers of parchment cartons suitable for packing cream, honey, etc.?* (Cornwall.)

Suggestions were made.

782. *I should be glad to know of any people interested in the buying of chicken fat.* (England.)

Suggestions were made.

Vacuumising of Glasses.

783. *After drawing the vacuum in glass-packed meat pastes we find that the lids will not hold long enough for us to get them through the sealing machine.*

It would appear that there is something faulty in your methods of carrying out the operations. We would suggest that you give attention to the following points:

1. It is essential that the tops of the glasses be cleaned before the lids are placed in position.
2. The vacuum should not be more than 15 to 17 inches.
3. This vacuum should be drawn slowly.
4. It is essential to have soft rubber rings.

If these conditions are fulfilled there should be no difficulty in vacuumising the glasses so that the lids are held in place by vacuum only, long enough to enable them to be passed through the sealing machine.

One must confess, however, that it is not an easy job to vacuumise meat paste in glass jars. Actually, after vacuumising and sealing the glasses can be processed either in water or in steam.

It is claimed that the advantages of vacuumising are principally that it reduces the discoloration on the top of the meat paste.

784. *Will you kindly furnish us with the names of firms supplying onion peeling machines?* (Wales.)

This was done.

785. *We note that one of your correspondents asked for information as to the names of makers of Swiss roll machinery. We should be glad to have this also.* (Lincolnshire.)

This was supplied.

786. *We are anxious to get into touch with a firm in Surrey who, we understand, are manufacturing glacé cherries. Could you give us the name of this firm?* (*Glasgow.*)

Name supplied.

Preserved Ginger.

787. *We would be pleased if you could recommend firms manufacturing small-scale plant for making both wet and dry mustard—from the grinding of the seed to the finished product.*

Also, could you give us any information on the method of preserving ginger? (New Zealand.)

Particulars of firms able to supply plant for mustard preparation were furnished.

As regards preservation of ginger, this is a very general question, and to give anything like a definite answer further information would be required. The type of ginger makes a difference to the details of processing. In general, however, it consists of cleaning, peeling, blanching in hot water, cooling in cold water, immersion in syrup and boiling in syrup, and a repetition of the syruping processes at regulated strengths.

788. *Can you put us in touch with any firms specialising in filling machines for viscous liquids?* (Ireland.)

This was done.

789. *Will you kindly put us in touch with a reliable supplier of cornflour and egg powder?* (Ireland.)

This was done.

790. *Can you let us know the first-hand makers of the margarines used in the bakery trade?* (Birmingham.)

Names were supplied.

791. *We should be glad if you would supply us with the method of preparing powdered pectin from both oranges and lemons. Also what plant would be necessary, and who supplies this?* (East Africa.)

Reference should be made to an article on this subject published in the May, 1932, issue of FOOD MANUFACTURE.

The required names of firms were furnished.

New Companies

C. AND U., LIMITED. (266961.) 6, Conduit Street, W. 1. To acquire an option to purchase patent rights in respect of Hong Kong, The Straits Settlements, and the F.M.S., in a process for the mnfre. of solid carbon dioxide, etc. Nom. Cap.: £100 in £1 shares.

BRITISH PIG INDUSTRIES, LIMITED. (266959.) 30, West Street, Charlton, S.E. To carry on the bus. of breeders of and dlrs. in live and dead farm stock and agriculture, etc. Nom. Cap.: £500 in 1s. shares.

LONDON SCOTTISH CAKES, LIMITED. (266976.) 69, Lincoln's Inn Fields, W.C. 2. To carry on the bus. of biscuit mnfrs. and bakers, etc. Nom. Cap.: £500 in £1 shares.

R.B.C., LIMITED. (266873.) 29, King Street, Baker Street, W. 1. To carry on the bus. of tea and provision mchts., etc. Nom. Cap.: £800 in £1 shares.

L. NOEL AND SONS (1932), LIMITED. (266894.) 6, Devonshire Grove, Old Kent Road, S.E. 15. To carry on the bus. of preservers of all kinds of fruit, vegetables, and other produce, etc. Nom. Cap.: £100 in £1 shares.

FOOD MACHINERY (M. AND P.), LIMITED. (266889.) Park Works, Newton Heath, Manchester. To carry on bus. as agents for and dlrs. in machinery of all types, etc. Nom. Cap.: £1,000 in £1 shares.

GREEN RING TEA COMPANY, LIMITED. (266823.) To take over the bus. of the Green Ring Tea Company, including the trade mark Green Ring. Nom Cap.: £1,000 in 10s. shares.

KNIGHT AND BLACK, LIMITED. (266829.) To carry on the bus. of mnfg. confectioners, etc. Nom. Cap.: £500 in £1 shares.

ROSS T. SMYTH (OVERSEAS), LIMITED. (266921.) Holland House, Bury Street, E.C. To carry on the bus. of mchts., agents, and brokers of grain, corn, and foodstuffs, and in particular to carry on such bus. with persons, firms, and corporations outside Great Britain which are controlled by Ross T. Smyth and Company, Ltd., or in which that company is interested, etc. Nom. Cap.: £5,000 in £1 shares.

NORTHERN VINEGAR COMPANY (SHEFFIELD), LIMITED. (266837.) To carry on the bus. of mnfrs. of and dlrs. in vinegar, etc. Nom. Cap.: £1,500 in £1 shares.

H. LANDAU, LIMITED. (266466.) 134-136, Commercial Road, E. 1. To carry on the bus. of sweet mnfrs., bakers, confectioners, etc. Nom Cap.: £1,000 in £1 shares.

CLOTTU, LIMITED. (265958.) Lloyds Bank Chambers, Waterloo Road, Blackpool. To take over the bus. of a mnfr. of chocolates, etc., cd. on at 33, Corporation St., and 38, Bond St., Blackpool, as "Clottu." Nom. Cap.: £1,000 in £1 shares.

A. GRANGER AND SON, LIMITED. (266566.) To take over the bus. of bakers and pastrycooks cd. on at 2, Bellenden Road, and elsewhere in Peckham. Nom. Cap.: £3,000 in £1 shares (2,300 preference and 700 ordinary).

W. MILLS AND SON, LIMITED. (266592.) To take over the bus. of wholesale confectioners, etc., cd. on at 57, Shakespeare St., Chorlton on Medlock, Manchester, by William Mills and Son. Nom. Cap.: £1,000 in £1 shares.

INTEGRITY PRODUCTS, LIMITED. (266594.) To carry on the bus. of mnfrs. of and retailers of foods, foodstuffs, beverages and toilet preparations; remedies; Fluora soil-foods, etc. Nom. Cap.: £15,000 in 6,500 "A" preference and 8,000 "B" preference shares of £1 each, and 10,000 founders' shares of 1s.

MARKHAM CONFECTIONS, LIMITED. (265971.) To carry on the bus. of bakers, confectioners, etc. Nom. Cap.: £500 in £1 shares.

CONDENSED MILK PRODUCERS, LIMITED. (266965.) 1-3, Stanley Street, Liverpool. To carry on the bus. of mnfrs., canners, and preservers of and dlrs. in milk, fruit, etc. Nom. Cap.: £100 in £1 shares.

S. HEALING AND SONS, LIMITED. (266018.) Borough Flour Mills, Tewkesbury, Glos. To take over the bus. of millers cd. on at Tewkesbury as "Samuel Healing and Sons." Nom. Cap.: £120,000 in £1 shares (60,000 pref. and 60,000 ord.).

INTERNATIONAL BISCUIT COMPANY, LIMITED. (265778.) Progress Works, Agnes Road, Old Trafford, Manchester. To carry on the bus. of mnfrs. of and dlrs. in biscuits, etc. Nom. Cap.: £15,000 in £1 shares.

OVERSEAS MICA AND PRODUCE COMPANY, LIMITED. (266474.) 34, Hillcrest Avenue, Edgware, Middlesex. To enter into an agreement with J. D. Jones and Co. (London), Ltd., to act as agents or managers for any mica or other company, syndicate, or individual, and to carry on the bus. of mica importers and merchants, etc. Nom. Cap.: £100 in £1 shares.

JOHNSON'S CEREAL FOOD COMPANY, LIMITED. (265968.) To carry on the bus. of bakers, etc. Nom. Cap.: £100 in £1 shares.

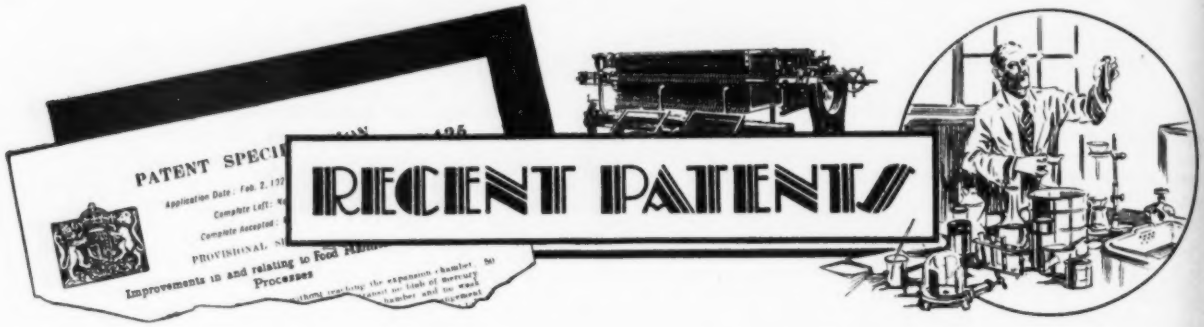
The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.

A Notable Achievement

IT is not often that the single-handed efforts of one man—not a politician, but just a plain manufacturer and technical expert—is able to influence the trend of a Government's policy. Yet this feat has recently been achieved by Mr. Bradley Dewey, President of the Dewey and Almy Chemical Company, Cambridge, Mass. This is how it came about:

The Senate Finance Committee, sitting on the 1932 Revenue Bill (now law), says *The Glass Packer*, was seriously considering a tax on all rubber imports and rubber stocks held throughout the country. The idea did not reach the Senate. It was killed in the committee when Mr. Dewey presented to them the actual facts of the case—which proves that Senators will listen to reason, when reasons are presented; at least, such appears to be the case in America, though it is doubtful if these rational methods would work over here. We take off our hat to Mr. Dewey!

Like Edison, Mr. Dewey is an outstanding example of a technical man and experimentalist who has built up an admirable business by first realising the need for an article (in this instance a can sealing compound), then concentrating all his efforts and technical knowledge in the face of apparently insurmountable difficulties in producing this article superior to any previously known, and, thirdly, continuing to employ the resources of science for the progressive improvement and the extension of the application to other uses of this product. As Mr. Dewey has remarked, "*Such research is the manufacturer's assurance that he can continually improve his products and at the same time offer new ones as his customers' requirements change with the general advance in industry. Research makes friends of its customers and profit for all concerned.*" The italics are ours, for we have rarely met with a statement that has so effectively crystallised out our own views on this matter. This is the spirit that we should like to see more in evidence over here. High-pressure salesmanship is all very well, but a product perfected to the utmost capacity will always sell itself!



These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents, and are published by permission of the Controller of H.M. Stationery Office, and the Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

374,894. SWIFT AND COMPANY: Gelatine food product and method of preparing the same.

375,015. THOMPSON, A. J.: Machine for the production of black puddings, and the like.

375,114. LOCKYER, E. G. F.: Apparatus for keeping food hot or cold.

374,611. BRAMIGK AND COMPANY, LTD. (GERHARDT, B.): Curing meat, and apparatus therefor.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts Published

Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

369,391. **Preserving food.** WHITE, A. E., 5, Quality Court, Chancery Lane, London. (Vitapack Corporation, 350, Park Avenue, New York, U.S.A.)

Food is preserved in containers by subjecting it therein to a vacuum sufficiently high and for a period sufficiently long—*e.g.*, 10 to 15 seconds—to remove air and initiate the evolution of water vapour, which drives off part of the occluded air from the food; next supply an inert gas—*e.g.*, carbon dioxide—to the containers and finally sealing them. The containers may be filled with inert gas at substantially atmospheric pressure. The process may be applied to dry goods—*e.g.*, dried milk—sufficient water being still present therein.

369,990. **Food products.** BOLLMANN, H., 5, Alsterdamm, and REWALD, B. A. (known as Rewald, B.), 3, Alsterdamm, Hamburg, Germany.

Emulsions of lecithin, with or without added oils, suitable for the preparation of baked goods, are prepared solely with the aid of benzyl alcohol, glycol, or the homologues, derivatives, or substitution products thereof, such as propylene or amylene glycol, tolyl, or phenyl-propyl alcohol, glycol ethyl ether, glycol-chlorhydrin, pinecone. For example, 90 parts of lecithin, containing 30 per cent. of oil, and mixed with 10 parts of benzyl alcohol and the mixture dispersed in a dough prepared from meal and water. Specification 277,746 (Class 81 [*i.*], Disinfecting, etc.) is referred to.

The Specification as open to inspection under Sect. 91 (3) (*a*) refers to the use of other alcohols or derivatives or substitution products thereof. This subject-matter does not appear in the Specification as accepted.

369,633. **Food preparations; confectionery.** TRIGGS, W. W., 57, Lincoln's Inn Fields, London. (Tropical Vitamin Co., Inc., Orange Avenue, Orlando, Florida, U.S.A.)

Vitamin-containing fruit preparations are obtained by adding a concentrated vitamin extract or extracts to a citrus mass or a fruit mass having an equivalent chemical effect, or a mixture of both kinds. The fruits used include oranges, lemons, grapefruit, tangerines, kumquats, pineapple, apricots, and dates, and a preservative and sugar may be added. Vitamin extracts from yeast, lemon, orange, grapefruit, spinach, cabbage, lettuce, parsley, carrot, tomato, alfalfa, wheat embryo, cod liver oil, raw fresh liver, egg yolk, butter and fat from heart, liver, and kidney may be employed. In an example, 16 gm. of a mixture of dried vitamin extracts from cod liver oil, wheat embryo, and yeast are mixed to a fine homogeneous mass with 12 gm. of dehydrated and 12 gm. of crystallised citrus fruit; the product may be rolled into sheets and cut into shapes, or may be compressed, moulded, etc., into cakes, tablets, etc. The cakes, etc., may be given an air-excluding coating of chocolate or sugar or be wrapped in waxed paper, tinfoil, etc. The fruit is stated to have a preservative and activating effect on the vitamins.

Vinegar Colouring

IN the first part of the article on "The Manufacture of Pure Malt Vinegar," the addition of a caramel which would stand bright in the finished vinegar was emphasised. The attention of those interested is drawn to the fact that a new caramel having a colour value of approximately 30,000° Lovibond and specially prepared for vinegar manufacture is sold under the name of "Vinegar Caramel Special" by A. Boake, Roberts and Company, Ltd., of Stratford, London, E. This colouring is proving most satisfactory, particularly with onions. The above firm also make a vinegar caramel having a colour value of 50,000° Lovibond; economically, this should be a very attractive proposition for vinegar manufacturers.

FOOD MANUFACTURE is sent to any address in the World for 10s. per annum. Send your subscription now to LEONARD HILL, LTD., Thanet House, 231-2, Strand, London, W.C. 2.

Ayn Rand